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[PROC. ROY. SOC. VICTORIA, 56 (N.S.), PT. II., 1945.]

ART VII.—*Records of Plant Remains from the Upper Silurian and Early Devonian Rocks of Victoria.*

By ISABEL C. COOKSON, D.Sc.

[Read 11th November, 1943; issued separately 30th June, 1945.]

In the period that has elapsed since 1935 when my last paper on Victorian Palaeozoic plants was published, further collections have been made from several hitherto unknown localities in the same stratigraphical series. These specimens were put aside pending the discovery of further examples which, it was hoped, might give more detailed information regarding the morphology of our early plant types. However, in order to facilitate the work of geologists interested in Palaeozoic stratigraphy, it has been suggested that the genera found at these new localities should be put on record now. This is therefore done below and for the sake of completeness, lists of plant remains from previously recorded outcrops are included. The botanical discussion of morphological details is being left until a later time.

Owing to the incompleteness of some specimens, a final determination cannot be made. The letters cf. before a species name denotes that the fossils are most likely referable to the species given.

I am indebted to Mr. W. Baragwanath and Rev. E. D. Gill, B.A., B.D., for information regarding some of the localities mentioned.

YEA—ALEXANDRA DISTRICT.

Killingworth-road, Yea. ¼ mile from Yea to Molesworth-road. Geol. Surv. loc. 14 (10, 5).

Baragwanathia longifolia.

cf. *Hostimella* sp.

Brackley's Cutting, Yea, to Cheviot-road, south of turn off Yea to Mansfield-road. Geol. Surv. loc. 4 (4, 5).

Baragwanathia longifolia.

Gobur, near allotments 9 and 10, east of township site. Geol. Surv. loc. 19 (5).

Baragwanathia longifolia.

Railway cutting, near Alexandra, between 99¼ and 99½ miles from Melbourne. Geol. Surv. loc. 9 (5, 10).

Baragwanathia longifolia.

First railway cutting out of Alexandra railway station. Geol. Surv. loc. 5 (5, 10).

Baragwanathia longifolia.

Mount Pleasant, 1¼ miles from Alexandra on the old road to Thornton (1).

Pachytheca sp.
Zosterophyllum australianum.
cf. *Hostimella* sp.
Hedeia corymbosa.
cf. *Yarravia.*
cf. *Baragwanathia longifolia.*
"*Pinnately branched axes*".
"*Stems with small spirally arranged elevations*".
"*Circinately coiled tips*".

Hall's Flat-road—cutting on road from Alexandra to Hall's Flat, about one mile from the former (1).

Zosterophyllum australianum.
"*Pinnately branched axes*".

GAFFNEY'S CREEK—WOOD'S POINT DISTRICT.

Gaffney's Creek, road cutting near Police station (8).

cf. *Hostimella* sp.

Wood's Point, road to Comet Mine (9).

Zosterophyllum australianum.
cf. *Hostimella* sp.
"*Stems with small spirally arranged elevations or depressions*" (9) cf. Mt. Pleasant, Alexandra (1).

Indeterminate plant fragments have been collected from outcrops on the road from Gaffney's Creek to Wood's Point.

ENOCH'S POINT DISTRICT (6).

Cable's Creek, a western tributary of Big River south-west of Enoch's Point.

Baragwanathia longifolia (6, 8).

Enoch's Creek, east of township of Enoch's Point (6).

Baragwanathia longifolia.

WOOD'S POINT—WARBURTON DISTRICT.

Quarry on Yarra Track, about 20 miles east of "McVeighs" (3).

Baragwanathia longifolia.

Quarry on Yarra Track, about 19 miles east of "McVeighs" (10, 4, 3).

Baragwanathia longifolia.
Yarravia oblonga.
Yarravia subsphaerica.
cf. *Hostimella* sp.

Quarry on Yarra Track, about 18 miles east of "McVeighs" (3).

Zosterophyllum australianum.
cf. *Hedeia corymbosa.*
cf. *Hostimella* sp.

Quarry on Yarra Track, 10½ miles east of "McVeighs" (3).
Zosterophyllum australianum.

Road cutting on Warburton-Wood's Point-road, about 16½ miles east of Warburton and adjacent to Yankee Jim's Creek (3).

Pachytheca sp.
Zosterophyllum australianum.
Hostimella sp.
"*Pinnately branched axes*" cf. Mt. Pleasant, Alexandra (1).
"*Stems with small spirally arranged elevations or depressions*". cf. Mt. Pleasant (1).

Indeterminate plant fragments occur at several localities between McVeigh's and McMahon's Creek, 11½ miles east of Warburton.

LILYDALE DISTRICT.

Hull-road, Parish of Mooroolbark, 14 chains south of its junction with the main Melbourne-Lilydale-road. Gill's loc. 1 (2).

Sporogonites Chapmani.
Yarravia cf. *oblonga.*
Zosterophyllum australianum.
cf. *Hedeia corymbosa.*
cf. *Hostimella* sp.

Killara, Syme's Homestead (*vide* Gill, same volume).
cf. *Hedeia corymbosa.*

In adjacent quarries called Syme's Tunnel and Syme's Quarry indeterminate plant fragments occur.

WALHALLA DISTRICT.

Knott railway cutting below bridge (9).
Hostimella sp.

Thomson River—"Jordan River Beds" (11, loc. 1, 10).
Baragwanathia longifolia.
cf. *Hostimella* sp.

Walhalla—Centennial Beds.

Loc. 1, about half a mile up east branch of Stringer's Creek (9).
Sporogonites Chapmani f. minor.
Loc. 2, North-road Quarry, about 1 mile north of Walhalla on Walhalla-Aberfeldy-road (9).
Hostimella sp.
Zosterophyllum australianum.
Sporogonites Chapmani.
Pachytheca sp. (1).

Plant remains have been recorded also from Platina (8, 11, loc. 2), and by Thomas from Gould (4) and from cuttings on the Telbit-road (12).

SOUTH GIPPSLAND.

Silurian inlier, Parish of Kongwak, occupying allotments 15A, 15, 16, 12c, indeterminate plant fragments have been recorded as *Haliserites dechenianus* (7, 8).

Rhyll, Philip Island, No. 1 Bore, 327-350 feet.
cf. *Thursophyton* (8).

Livingstone Creek, between Cape Liptrap and Waratah Bay (8).
cf. *Hostimella* sp.
"*Circinately coiled stem tip*". cf. Mt. Pleasant (1).

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[PROC. ROY. SOC. VICTORIA, 56 (N.S.), PT. II., 1945.]

ART. VIII.—*Note on Cretaceous Strata in the Purari Valley, Papua.*

By S. WARREN CAREY, D.Sc.

(Published by permission of the Directors of the Australasian Petroleum Company.)

[Read 11th November, 1943; issued separately 30th June, 1945.]

The phragmacone of a belemnite was found in the upper Purari Valley in January, 1894, by Sir William MacGregor, (1). No further geological observations were made in that area until 1940 when Cretaceous strata were found by the present writer. It now appears that there are extensive outcrops of Mesozoic rocks in the area between Hathor Gorge and the Paw Valley, which lies some 15 miles east of the gorge on the left bank of the Purari. To date, only four field days have been spent on these exposures, so that our knowledge of the structure and succession is still rather rudimentary. The available data concerning these rocks are presented on a plan of the Paw Creek area (fig. 1).

Four straight sections have been measured, all within the same stratigraphic interval of about 6,000 feet. There is no direct evidence of fault repetition in this thickness, but some anomalous dips and disturbed strata have been noted and the examination has not been sufficiently thorough to deny the possibility of some faulting which might affect the observed thickness. However, a thickness of over 5,000 feet is found both in Sisa Creek and in the Paw Creek sections, and it is unlikely that detailed mapping would reduce the outcropping thickness of Lower Cretaceous strata to less than 5,000 feet, with the base still not exposed.

The sequence consists of massive or thick-bedded sandstones, and dark thin-bedded mudstones. The sandstones are dark-coloured and very hard, and in the field were thought to be tuffaceous, and described as greywackes. A typical sample (112) was examined in thin section, and found to consist almost entirely of materials of volcanic origin, not noticeably worn. The slide consists largely of plagioclase in subeuhedral forms. Quartz is present in angular grains, but it is quite subordinate to the plagioclase. Magnetite is common and apatite in small crystals is

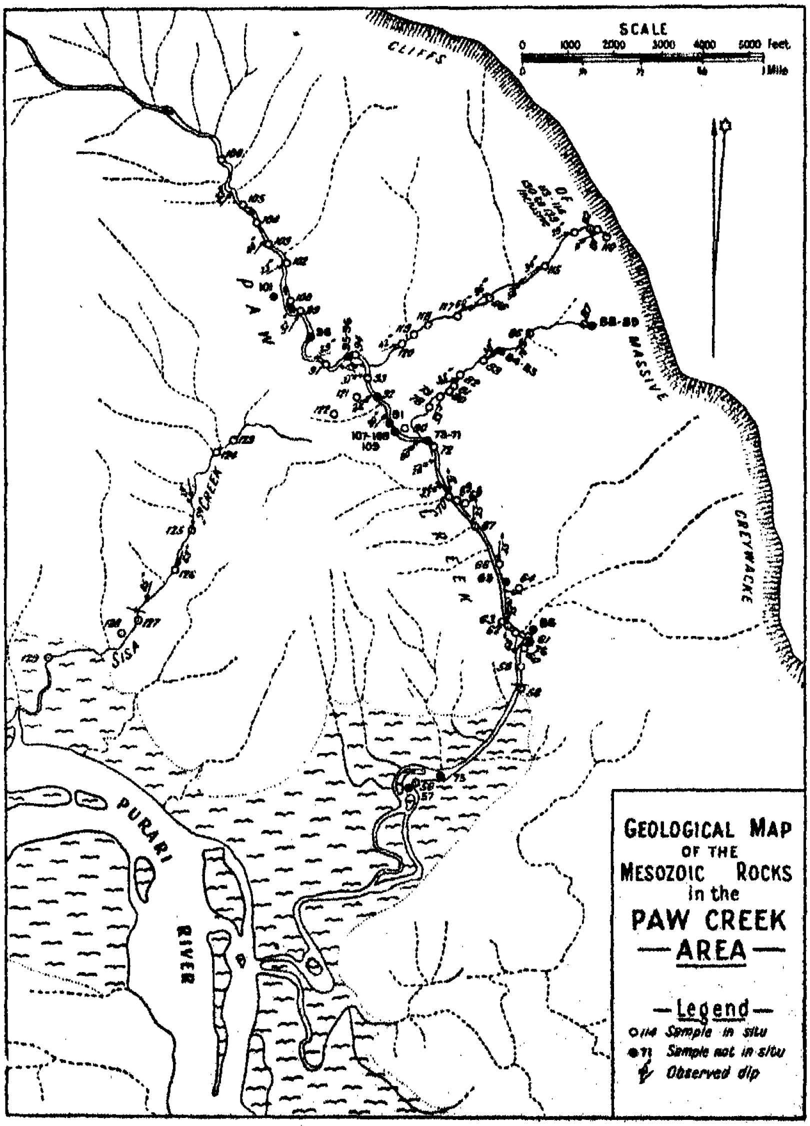

FIG. 1.—Paw Creek Area.
(Co-ordinates of south-west corner of map are 145° 56′ E., 6° 56′ S.)
"For the figure 86 on the lower portion of Paw Creek read 186."

present. There is a good deal of interstitial chlorite with epidote, but no real groundmass. Former ferro-magnesian minerals are represented mainly by their decomposition products, but a few ragged pieces of hornblende are present.

The sandstones are usually unfossiliferous, but one richly fossiliferous horizon was found packed with molluscan material. This horizon has been called the *Exogyra* bed. It is not more than 10 feet thick. Associated with it are thin bands of biscuity shales with indeterminate plant remains. The *Exogyra* bed has only been found along the north-east side of Paw Creek Valley about 1,000 feet from the top of the cliffs, which indirect evidence suggests may be capped with Eocene *Lacazina* limestone.

A meagre fauna of foraminifera and ostracoda and echinoid spines was found in the mudstones by Dr. Glaessner (2). He also reports that the *Exogyra* bed contains *Exogyra* cf. *couloni*, *Ostrea*, and a gastropod and a pelecypod not determinable on the samples available. Both assemblages are determined by him as of Aptian-Albian age.

Overlying the Cretaceous rocks are lower Tertiary strata which in different sections rest on different horizons of the Cretaceous beds. Thus on the north-east side of Paw Creek 3,700 feet of dominantly arenaceous strata with the *Exogyra* bed about 1,000 feet from the top, are present below the Eocene. On Sisa Creek only 2,600 feet of arenaceous beds are present beneath the *Lacazina* limestone, and the *Exogyra* bed is not present. On the lower part of Paw Creek itself, only 1,100 feet of the arenaceous beds are present followed by limestone. Again the *Exogyra* bed is missing. In Noakes's Chimbu section (4) on the other hand, the stratigraphic equivalents of these Paw Creek beds, including the molluscan bed, are followed by a considerable development of Cenomanian strata, before the *Lacazina* limestone is reached. While some of these relationships are possibly complicated by faulting, it is difficult to escape the conclusion that a strong erosion interval amounting probably to angular unconformity separated the Cretaceous and Eocene in the Purari area. No angular unconformity has so far been observed in the field.

PAW VALLEY SAMPLES NOT *in situ*:

The material collected not *in situ* in the Paw Valley, falls into six categories:

(1) Material definitely derived from the *Exogyra* bed (samples 84, 85, 88, 89).—These samples occur in a scree slope at the foot of a cliff in which the *Exogyra* bed is known to outcrop, and they are identical in lithology and fauna. They need no further comment.

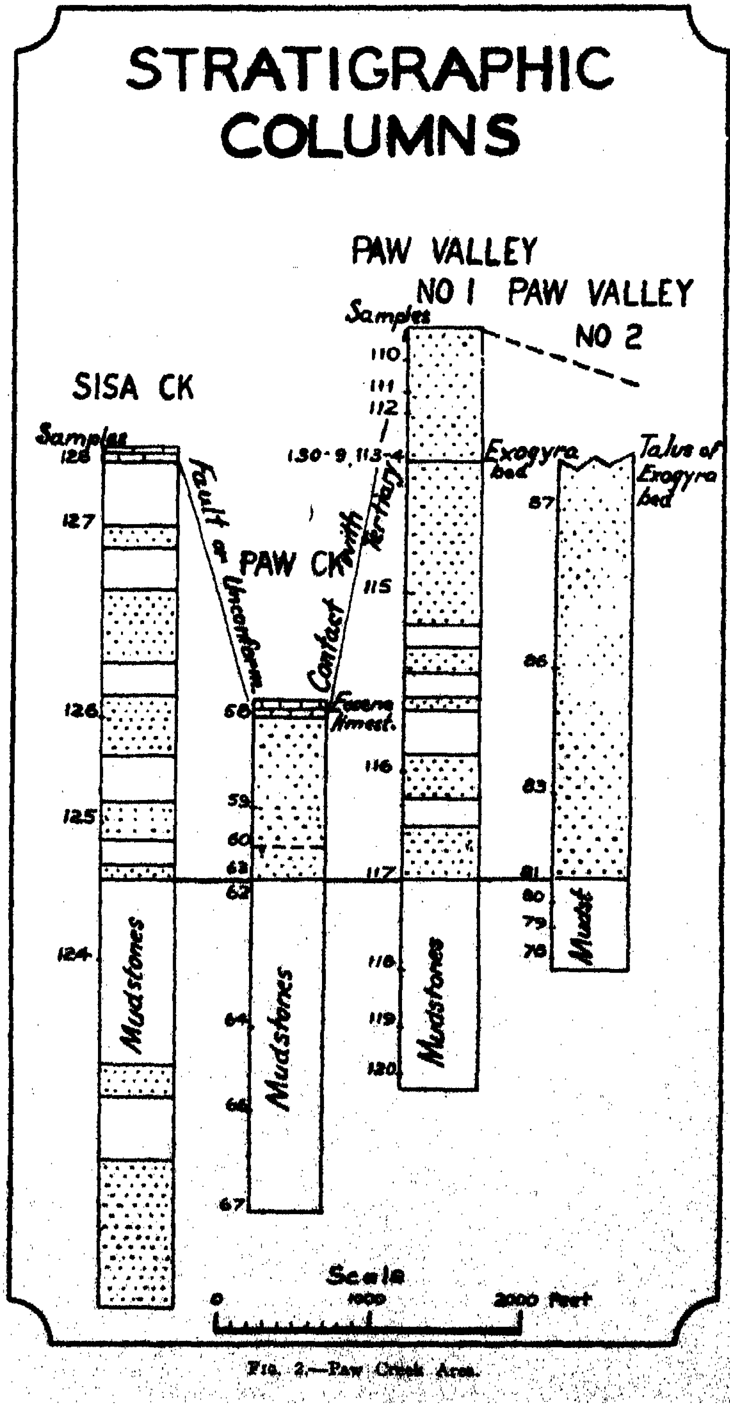

Fig. 2.—Paw Creek Area.

(2) Belemnite-bearing sandstone (sample 186).—A large belemnite was found in an otherwise barren sandstone block in the Paw Creek bed (for locality see map). It could not have travelled far for the belemnite was quite loosely attached to the sandstone. The belemnite was determined by Dr. Whitehouse as *Tetrabelus* n.sp. It is now described by Dr. Glaessner as *Tetrabelus macgregori* after the distinguished pioneer who half a century ago first recorded the presence of belemnites and Mesozoic strata in this part of New Guinea.

There is no reason to believe that the belemnite belongs to the *Exogyra* bed itself; it seems more probable that it was derived from one of the sandstones which are not generally fossiliferous. Near where the belemnite was found a molluscan sandstone was found (sample 61), carrying large numbers of an oval pelecypod referred by Glaessner to the genus *Pseudavicula*. This has a different lithology from the *Exogyra* bed, and the rest of the loose boulders, though the genus is present in other samples. Like No. 186, this sample is soft and little abraded and does not appear to have travelled far.

(3) Plant-bearing material (samples 75, 76).—A couple of well-worn pebbles of biscuity shale containing plant remains were found in the bed of Paw Creek. Their source is apparently somewhere among the strata in the Paw Valley, which as far as is known, are all Cretaceous, except perhaps a capping of Eocene limestone on top of the range overlooking it on the north-east. Plant-bearing beds of not very different lithology were found *in situ* in close association with the *Exogyra* bed, but the plant remains there were very broken with no recognizable pinnules. Samples 75 and 76 were sent to Dr. A. B. Walkom, who reported that they are "too fragmentary for very accurate determination. They represent portions of pinnae, usually with several elongated, somewhat wedge-shaped pinnules with venation of a general sphenopteroid type. Thus they belong to a species of the form-genus *Sphenopteris*. Of the species known to me (Walkom) as occurring in Australia, the Purari River specimens show some resemblance to *Sphenopteris erecta* (Tenison-Woods) which has been figured (Queensland Geological Survey, Publication 263, Plate 5, figs. 4 and 5) from the Burrum series of Queensland. The Burrum series is of Cretaceous age. . . ."

(4) *Lacazina* limestone (samples 56, 73, 74, 128).—Two specimens were collected from boulders of *Lacazina* limestone in the bed of Paw Creek about 4 miles from the mouth. They are both from fairly large though well-worn boulders, and occur in an area believed to be entirely Mesozoic. The only reasonable interpretation of their occurrence seems to be that the Eocene limestone must cap the range on the north-east side of the valley at least in some parts, and that the material has fallen and been

transported down the mountain side to the stream bed. If this interpretation is correct, the nearest possible point of origin is over a mile away, and 2,000 feet or more above.

(5) Cone-in-cone structure (sample 92).—In several places in the Paw Valley pieces of hard shaley rock were found showing well developed cone-in-cone structure. This has apparently been derived from the Cretaceous strata, but was not observed *in situ.*

(6) Molluscan calcareous sandstone (samples 57, 65, 75, 77, 91, 98, 101, 107, 108, 109, 140).—At several points on the floor of the valley both near the head and near the mouth a large number of well-worn blocks of hard calcareous sandstone packed with fossils was found. These have a different lithology from the *Exogyra* bed, which is softer and much less limy, and there is no definite reason to assume that they belong to the same horizon. However, no blocks of this material were found in either of the tributary creeks where the *Exogyra* bed is known to outcrop. It may be, however, that the *Exogyra* bed is a facies of the same bed as yielded the other samples, and that it is for this reason that the calcareous type was not found in the section or creeks containing the *Exogyra* bed. In any case, the horizon of the Molluscan material cannot be very different from that of the *Exogyra* bed. There is a fair amount of variation between the many blocks of this group. A fine-grained type is packed with small gastropods, and approaches in character towards a hard blue limestone. Other types have more pelecypods. Another type is quite pebbly. According to Glaessner, the pebbles consist of hard grey marl, red and dark cherts, quartz, &c., and some phosphatic nodules.

The following molluscs have been determined by Dr. Glaessner from these samples.—*Trigonia, Cardium, Ptychomya, Pseudavicula, Ostrea, Mytilus, Alaria, Nerinea,* and *Tetrabelus macgregori.* Several other genera are present, but not sufficiently well preserved to be determined.

These molluscan beds are of considerable interest because the rock is hard and water-worn boulders of it have a characteristic conspicuous lithology which draws the attention even of the non-geologist passing it in the stream, with the result that it has been found over a large tract of country. If the doubtful cases are included it extends from near Kerema across the middle Purari to the Waghi Valley, and westwards as far as the Strickland.

(*a*) Numerous samples (15–26 inclusive, and 33) of these molluscan beds were collected by the writer in the bed of Wabo Creek. The lithology is identical with the Paw Creek material. Here it is associated with numerous large blocks of silicified wood, some of them a foot or so in diameter (sample 26F). The

molluscan beds were not found *in situ* for the section examined by the writer there did not reach them, but it was clear from structural relationships that the molluscan material must be derived from an horizon not very far below the Eocene limestone.

(*b*) Several samples were found in the Wheian Valley by the writer in 1939 (samples 69A-69F). Here again the structure is such that it is apparent that the molluscan beds cannot be very far below the lowest Tertiary beds. At the base of a section measured between the Wheian and Pio rivers, oyster bearing beds were found *in situ*, though not well preserved. These are about 400 feet below the base of the Tertiary strata. In this case it was only after comparison with samples from Paw Creek that the Cretaceous age could be inferred.

(*c*) Sample 144 collected in Hathor Gorge by the writer, and a sample collected by Patrol Officer Ethell a few miles south-west of Lake Tebera, also have this characteristic lithology.

(*d*) Further afield it is interesting to note that E. R. Stanley's description (3) of "dark calcareous sandstones and bluish-grey limestones containing *Orbitolites*, *Gryphaea*, *Modiola*, *Aviculopecten*, and *Belemnites*" at the "head of Karova Creek", fits very well with the lithology and facies of these other Cretaceous rocks, though subsequent work has thrown doubt on the authenticity of Stanley's locality.

(*e*) Dr. Glaessner states that a pebble of bluish-green sandstone containing abundant molluscan shells was collected by G. Barrow on the Strickland River. This pebble resembles the molluscan beds in Paw Creek. Glaessner also correlates these molluscan beds with the top of Noakes' "stage 2" in the Chimbu Valley section (4). Furthermore a fossiliferous rock corresponding closely to the Paw Creek molluscan beds was found by Mr. Vial, Patrol Officer, about 3 miles east of Mingenda.

Thus, these molluscan beds are likely to prove of great value in the correlation of the Cretaceous strata throughout a wide province. Evidence suggests that the richly fossiliferous material is confined to a narrow zone near the top of a thick section of sparsely fossiliferous sandstones and shales. Being resistant to erosion by virtue of its extra lime content, and the fossils being very conspicuous on waterworn surfaces, boulders derived from this narrow zone have been found and recorded over a wide area.

The Purari Formation:

A. Gibb Maitland has referred to the belemnite bearing strata recorded by Sir William MacGregor as the Purari beds (5). So far as the writer is aware the term "Purari beds," or "Purari formation" has not been used in any other sense in any published record. Hence it is proposed that this term be adopted.

The Purari formation as now defined is a sequence of marine mudstones and sandstones, with a thin zone near the top rich in lamellibranchs, gastropods, and occasional belemnites, which outcrops in the middle and upper Purari Valley. Its fauna is described by Glaessner, and determined by him as belonging to the upper part of the Lower Cretaceous. Its thickness has been proved to exceed 5,000 feet, but neither the base nor the top is as yet precisely determined. Fragmentary data suggest that the formation may be identifiable over a region embracing the upper Strickland Valley, Chimbu, the upper and middle Purari Valley, and possibly the hinterland of Kerema. The molluscan zone is a characteristic marker of this formation.

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ART. IX.—*The Mesozoic Stratigraphy of the Fly River Headwaters, Papua.*

By N. OSBORNE.

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Abstract.

The headwaters of the Fly River, known to the local natives as Wok Feneng, expose a thick section of Mesozoic sediments in a south dipping monocline on the rugged southern fall of the Central Highlands of New Guinea. These underlie, without apparent angular discordance, the Tertiary limestones supporting the rough mountain ranges or "Limestone Barrier" along the foot of the Central Highlands in western Papua.

The Mesozoic section totalling nearly 7,500 feet of marine sediments is divided on lithological grounds into two distinct units of sedimentation, each dominantly argillaceous at the top and arenaceous at the bottom. These two units have been named Feing and Kuabgen groups respectively. Both are fossiliferous and an examination of the fossils by Dr. M. F. Glaessner establishes the age of the Feing group as Cretaceous (Cenomanian-Albian) and of the Kuabgen group as Upper Jurassic.

The character of the basal Kuabgen rocks suggests a derivation from granitic basement which probably underlies them at no great depth. The time break between the Kuabgen and Feing groups, together with the composition of the basal Feing deposits suggests an Albian transgression over the uppermost Jurassic. An important unconformity is indicated also between the Feing group and the Tertiary limestones by another big time break and a sudden and complete change in lithology.

Introduction.

The object of this paper is to describe the occcurrence of Mesozoic sediments in the headwaters area of the Fly River, referred to hereafter as the Feneng area, to give an account of the section exposed and to indicate its significance in respect to the Mesozoic geological history of New Guinea.

The Fly River rises in the Central Highlands of New Guinea in Papuan territory about 40 miles from the boundary with Netherlands New Guinea and very close to the Mandated Territory border. The main headwaters stream is called by the local natives, Wok Feneng, Wok being the native word for water. The principal tributaries of the Fly are the Alice River (Ok Tedi) to the west and the Palmer and Strickland Rivers to the east.

In this area a series of extremely rough precipitous limestone mountains rises along the foot of the Central Highlands, to be breached in deep narrow gorges by the Fly River and many of its larger tributaries. This "Limestone Barrier" has presented a formidable obstacle to exploration of the main divide.

Karius and Champion (1929) were the first to negotiate these limestones when they crossed the Central Highlands from the Fly to the Sepik River in 1927-8 but they made no observations of stratigraphic value.

Earlier explorations failed to penetrate the Limestone Barrier, but samples collected from the upper Alice River by Austin (1923) and examined by Chapman (1925), and from the Wai Mungi (1924-5), indicated the limestones to be of Tertiary age; while Everill in 1884 found in the Strickland River or one of its tributaries at a point which has since eluded identification, fossils recognized by Wilkinson (1888) to be Cretaceous. [Further study by Dr. Glaessner and writer of Everill's record and comparison of his map with the recently compiled air photographic maps of Island Exploration Coy. indicate that the farthest point reached by his expedition was in the main Strickland River some 3-4 miles below the junction with the Murray River. The locality referred to by Wilkinson as the source of the Cretaceous fossils he identified, is now recognized as one in which very fossiliferous late Tertiary rocks outcrop, indicating that the Cretaceous specimens were not found in situ.]

Downstream from the outcropping limestones Everill also found waterworn pebbles containing ammonites determined by Etheridge (1890) to be Jurassic in age. Probably based on this discovery, Stanley (1923) and later David (1932) show on their maps a patch of Jurassic on this river around latitude 6-7° south. Field investigations by geologists attached to Island Exploration Company 1938-9 have shown that no Mesozoic rocks outcrop south of the Limestone Barrier and that the pebbles found by Everill must have been brought down by the swiftly flowing waters from some locality considerably further upstream. Likewise incorrect are the Mesozoic outcrops shown to occur on the Palmer River below its confluence with the Tully River, extending across to the Fly, and based apparently on stream pebbles picked up by Sir William McGregor and determined by Gregory and Trench (1916).

In 1937 a gold prospecting expedition headed by Ward Williams investigated some of the Fly, Strickland, and Sepik headwaters, and in the upper Om River one of the headstreams of the Strickland, they discovered "black shales studded with magnificent ammonites."—Campbell (1938). Specimens of these ammonites handed to Dr. W. Chawner of Island Exploration Coy. were sent to Dr. Reeside of the U.S. Geological Survey who reported (personal communication) that they are Perisphinctids, indicative of an upper Jurassic or lower Cretaceous age. W. Korn, J. Burke, and W. Kienzle, members of the expedition travelled overland to the Central Highlands by way of the Fly River route and the Wok Kup but have not made available any maps or notes of their journey.

Geologists of Island Exploration Coy. investigating the petroleum possibilities of the Fly River region also found the limestone mountains a serious obstacle to the exploration required to complete the stratigraphic section. Air reconnaissance had shown that the limestone belt was succeeded to the north by an entirely different terrain and that in the main Fly River headwaters (Wok Feneng) and Strickland valley at least, south dipping monoclinal conditions of considerable extent gave promise that good sections of the pre-limestone strata might be exposed there.

Since transport in this remote and mountainous country was confined to native carriers, the difficulty in keeping geological parties beyond the Limestone Barrier supplied sufficiently to remain out long enough to perform useful work was one that could be solved only by the introduction of air transport. Consequently it was decided to send specially equipped expeditions into the upper reaches of both the Fly and Strickland Rivers, and to supply them with foodstuffs by dropping from the air at their most forward bases. It was decided also to send an expedition into the Upper Palmer River although the geology appeared from the air to be complicated by faulting. Here, however, the Limestone Barrrier is not so strongly developed and it is possible to employ native canoes for transport much closer to the area to be examined, thus obviating the necessity for air transport the success of which depends on clear weather, a condition not frequently fulfilled in this country. The months of December and January were chosen as the period of the year most likely to provide good weather.

The upper Palmer expedition was made in October-November, 1938, under the leadership of Dr. W. Chawner with W. D. Mott as assistant geologist. They measured and described some 3,450 feet of section which they considered unconformably underlies the Tertiary limestone, the upper part of the section being predominantly argillaceous, the lower arenaceous. The contained fossils were examined by Dr. M. F. Glaessner, company palaeontologist, who regarded them as indicating a Cretaceous (Cenomanian-Albian) age.

The Strickland expedition under G. Barrow, December, 1938, and January, 1939, ascended that river with great difficulty to a point some 16 miles above Murray Junction without getting out of Tertiary strata and was prevented by supply troubles from penetrating further.

The Wok Feneng Expedition.

The upper Fly expedition, known as the Wok Feneng Expedition, led by the author with the late G. Sadler, assistant geologist, E. Ross and R. Ely, field assistants, and 70 Papuan natives.

started November 27th, 1938, from a base on the Palmer River, 12 miles above its junction with the Fly River and the limit of water transport convenient to the expedition. The author had made an air reconnaissance with Dr. Washington Gray a few days previously with the object principally of selecting a suitable locality for establishing a base beyond the Limestone Barrier for dropping supplies.

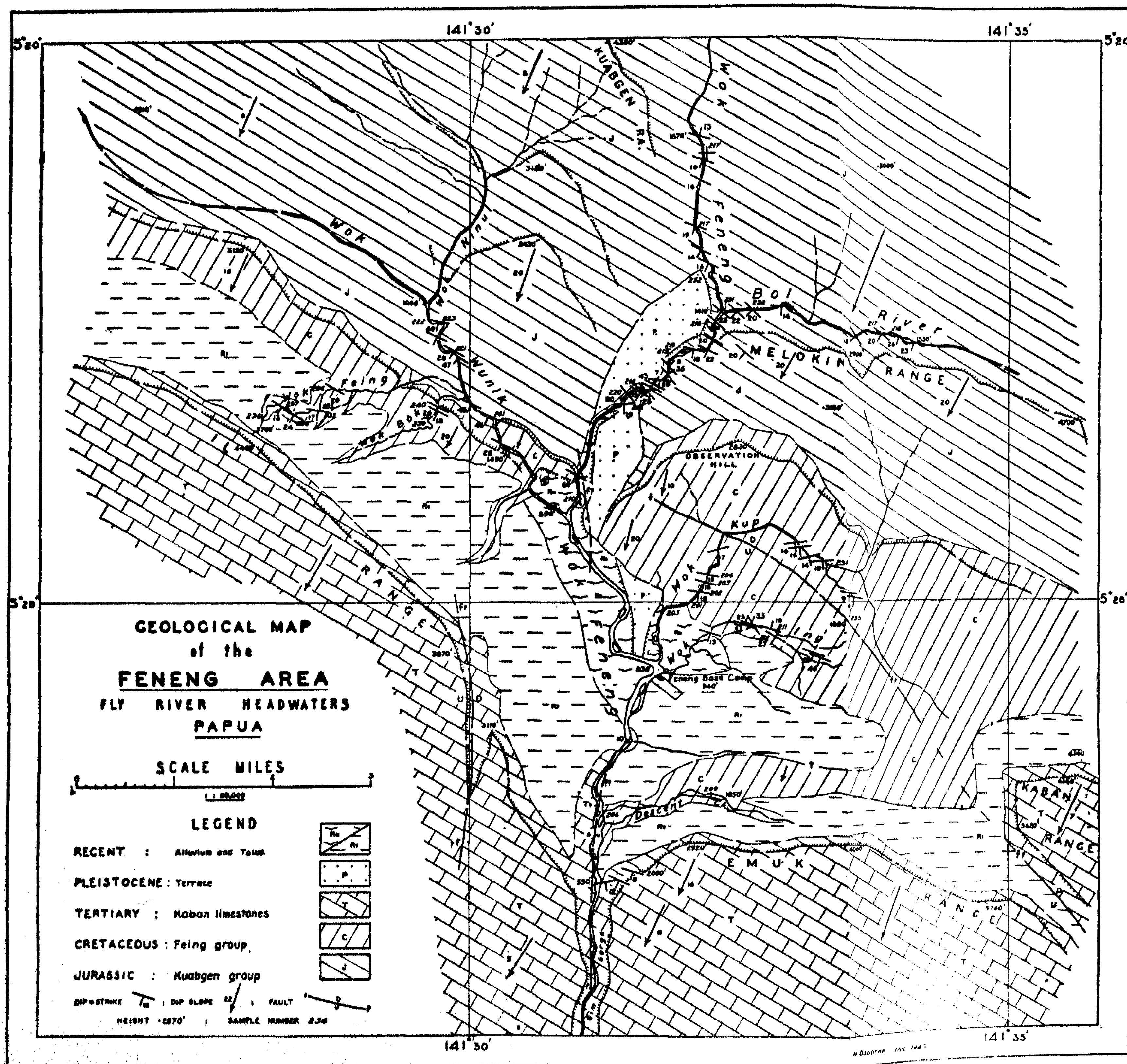
There is no native track across the limestones here and the route followed was roughly that taken by Korn, Burke, and Kienzle along the lip of the Fly River gorge on the east side.

The selected dropping base on the Wok Feneng at its junction with the Wok Kup and Wok Ing was reached December 16th, the journey of 30 miles taking 20 days, adequate testimony to the difficult nature of the country which makes it necessary to relay supplies and equipment in short stages. Base camp was established here and all labour set to work immediately to cut a clearing in the jungle for dropping supplies. This was the Feneng Base Camp.

On arrival the party had enough food to allow the supply aeroplane seven days' grace on its scheduled date of arrival—December 22nd—and then in case of failure, enough to make a five days' return to the forward base on the south side of the Limestone Barrier. Fortunately the weather was fine December 23rd and 24th, and enough food was dropped and recovered to give the party a total of six weeks in the Feneng area.

Except for a small scale air sketch map by Campbell (*ibid.*) and the journey of Korn, Burke, and Kienzle, about which there was no record, the Feneng area was previously quite unexplored and unmapped. The party therefore had to make its own topographic as well as geological survey. It had been intended originally to fix the position of the Feneng Base Camp by astronomic observation using a theodolite and wireless time. However the portable radio set went out of commission before reaching the Feneng area so instead, careful bearings were taken to prominent peaks on the Il and Emuk Ranges, which were likely to be visible both from the Feneng area and from the south side at points whose positions were known accurately. With these and a latitude determination, the Feneng Base was fixed with reasonable accuracy. A base line was laid down in the clearing and from it a triangulation net was made of all other outstanding features visible. Individual traverses were then made by pace and compass methods using aneroid and hand level for heights.

A few traverses were made by Sadler and the author working together, but most of the exploration was carried out by each geologist working separately with his own carrying line in expeditions lasting up to eight days away from base.



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[To face page 134.]

The party left the Feneng area January 27th, arriving back at the forward base on the south side of the Limestone Barrier January 30th, 1939.

ACKNOWLEDGMENTS.

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Physiography.

The area covered by this paper is that part of the southern slopes of the Central Highlands of New Guinea occupied by the headwaters of the Fly River. It is a region of sharp relief and mostly high elevation.

The Limestone Barrier rearing conspicuously along the foot of the Central Highlands in this area is divided into three sections, called from west to east, Il, Emuk, and Kaban Ranges. The Il and Emuk Ranges are separated by the Gim Gorge (Pl. V., figs 1 and 3) through which the Fly River leaves the mountains to commence its 590 miles run to the sea. The Gorge is a narrow cleft less than 2,000 feet wide at the top and 1,500 feet deep, diminishing practically to river level down dip some 6½ miles downstream. A conspicuous though narrow air gap separates the Emuk from the Kaban Range. The three ranges present almost vertical cliffs, 1,500-2,000 feet high towards the north, but slope gently to the south. The highest point noted on the Il Range is about 4,400 feet, on the Emuk 5,700 feet, and on the Kaban Mt. Sari is about 7,000 feet.

The soft shales and sandstones immediately underlying the thick limestones have been much less resistant to erosion, and now constitute a wide stretch of low and subdued country at the base of the great limestone scarps, protected and modified by enormous talus slopes and residual blocks left by the receding scarps. The talus slopes and residual cover themselves have been modified by the tendency of the underlying shales to slump, the result being that they have assumed a low slope and possess a roughly mammilated surface at a distance from the scarps.

Below these soft strata the rocks are harder again, and becoming predominantly sandstones and conglomerates support high country in which has developed a series of conspicuous strike

ridges and dip slopes, the Melokin and Kuabgen being perhaps the most prominent (Pl. V., fig. 2). These constitute the southern limit of the Central Highlands proper. They are generally lowest where the Wok Feneng cuts through them in a gorge only a little less formidable than the Gim Gorge, and rise east and west outwards toward the divides with the Palmer and Alice Rivers respectively, where the relation of topography to geology becomes obscure. The Hindenburg Range comprising the core of the Central Highlands in this area is nowhere less than 8,500 feet high, some peaks reaching 10,500 feet. The Kuabgen Range rises to a height exceeding 4,400 feet, while the most prominent point on the Melokin Range is 4,700 feet. Further south, Observation Hill on a well developed strike ridge is 2,830 feet, and on its counterpart west of the Wok Feneng a peak 3,100 feet high was observed.

The Feneng is undoubtedly the main stream, but the Bol and the Wunik are only a little less important as water carriers. All the large streams are rapid and turbulent, have steep-walled valleys and are more or less choked with great boulders. Near the Feneng Base Camp the Feneng is relatively quiet for a distance of about 2 miles upstream, the width is 200-300 feet, and although shallow a canoe can be used with difficulty; but downstream the gradient to the mouth of the Gim Gorge averages over 90 feet per mile in a series of cascades, the width reducing to 150-200 feet. Between the junctions with the Wunik and the Bol the gradient increases from 60 to 110 feet per mile, width varying from 60 to 150 feet. Above Bol junction in the 2½ miles traversed the river is a torrent falling at the rate of over 300 feet per mile and the stream is full of enormous boulders which almost bridge it in places.

A high terrace sloping downstream along the Feneng from just above Bol Junction where it is about 300 feet above present river level to near Base Camp where it falls to less than 50 feet indicates an earlier course of the stream. A series of soft horizontal thin bedded clays in the low country around the confluence of the Feneng and its tributaries Kup and Ing and south of Base Camp suggests the existence of quite a considerable lake in perhaps the not very distant past, formed probably through a great landslide damming the mouth of Gim Gorge.

Despite the precipitous and sometimes almost vertical slopes, the whole country is clothed in dense jungle with the exception only of the small and relatively few native gardens, and a scrubby but tough vegetation on the top of sandstone ridges. Numerous conspicuous bare rock scars on the cliffs of the limestone ranges indicate the prevalence of large rock falls. Somewhat less conspicuous but still numerous are similar scars on the cliffs of the sandstone ridges.

The rocks are usually well exposed in the streams, but these are not always completely accessible and much physical effort is required to climb in and out of gorges to study exposures.

The shale members have suffered considerable slumping so that these rocks are frequently obscured. Particularly is this the case with the thick Feing mudstones in the main Feneng. Smaller streams, tributaries of the Wunik, provided the best sections in these strata.

Stratigraphy.

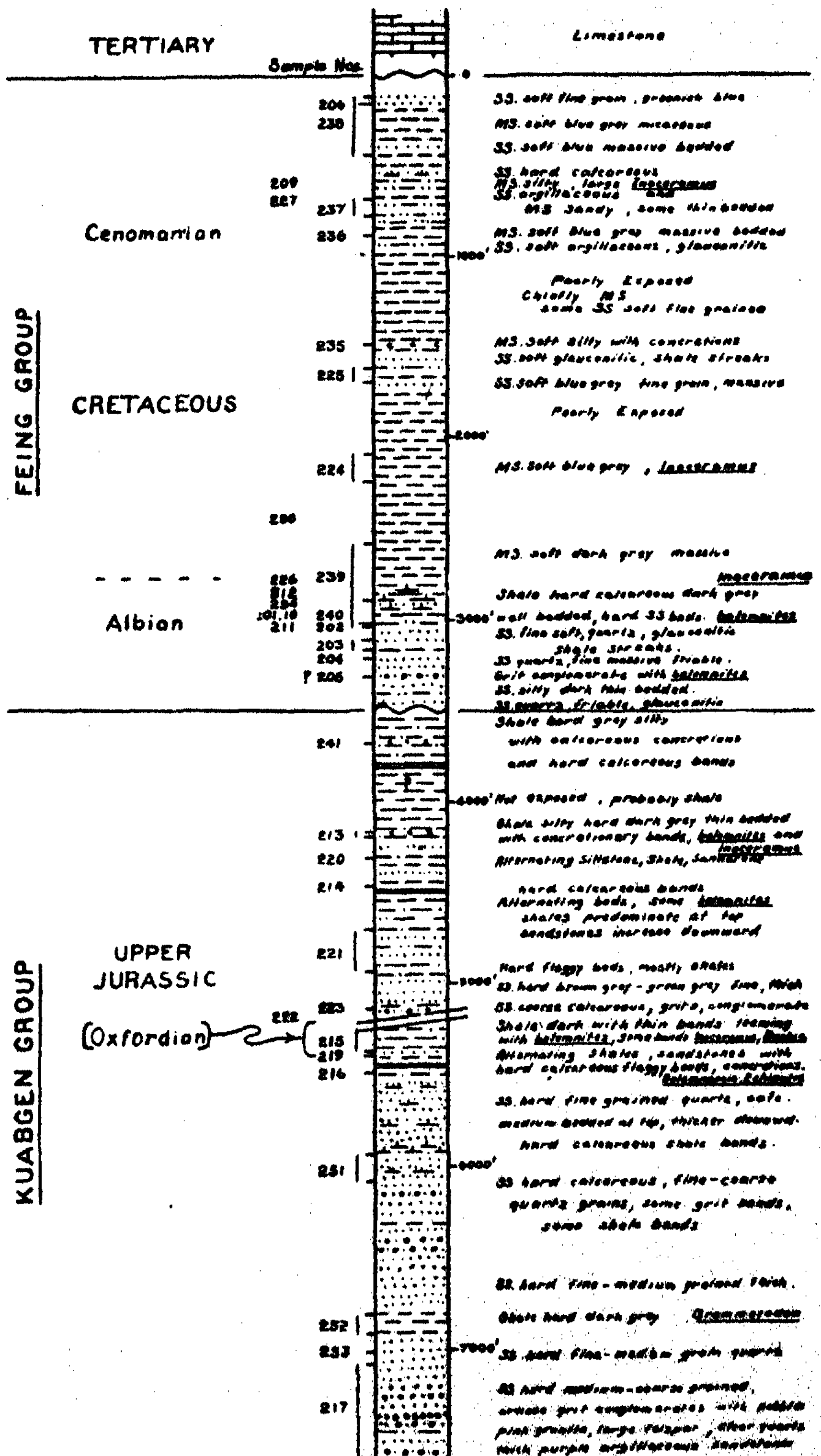
A thick section of marine sedimentary rocks totalling nearly 7,500 feet was found underlying the Tertiary limestones in the Feneng area. This section has been divided on lithological grounds into two distinct units of sedimentation named respectively Feing group and Kuabgen group. Both are dominantly argillaceous at the top and pass downwards into dominantly arenaceous strata, but the rocks of the lower Kuabgen group are slightly indurated and have a definitely older appearance.

Although the section is not very fossiliferous as a whole, *Inoceramus* and belemnites are fairly abundant in several widely scattered zones. Thus the age was recognized in the field as generally Mesozoic. Glaessner has examined the macro- and micro-fossils contained in the collected specimens and has assigned more specific age within the Cretaceous and Jurassic to the two lithological units. His determinations and conclusions are recorded in a paper entitled " Mesozoic Fossils from the Central Highlands of New Guinea," published simultaneously in these Proceedings.

The rock sample localities are shown on the accompanying geological map, and their position in the stratigraphic sequence on the columnar section for the Feneng area (fig. 1). This section illustrates the general character and thicknesses of the Cretaceous and Upper Jurassic sediments.

The contact between the Tertiary limestones and the Feing group has not been seen anywhere owing to the universal cover of talus at the foot of the great cliffs which mark the outcrop of these limestones everywhere in the Feneng area. However there is an abrupt and complete change in lithology and a big time break between them, the uppermost Cretaceous and the whole of the Eocene apparently being missing.

Chawner has reported the same situation in the Upper Palmer River some 20 miles east south-east, his Luap and Narin formations, sandstone and mudstone respectively, being almost identical in lithology, fauna and total thickness with the Feing group, while the Tertiary limestones from the two areas are also similar in character.



COLUMNAR SECTION for the FENENG AREA

FIG. 1.

However whereas Chawner postulates an angular unconformity between the Narin formation and the Kaban limestones, no evidence of an angular break was seen in the Feneng area. No actual contact was seen in the Palmer area either and the situation there was obscured also by faulting. In both areas the limestones appear to be underlain by the same Cretaceous formation, the close agreement in thickness and character between the Cretaceous sections exposed in the upper Palmer and the Feneng area suggesting that no persistent unconformity is present. Furthermore, wherever observed in the Feneng area the Feing mudstones appear to be dipping at about the same angle as the overlying limestones.

The evidence in the Feneng area suggests rather that the break between the Feing group and the Tertiary limestones represents chiefly a long period of non-deposition without appreciable folding or erosion.

Feing Group.

Extending from the foot of the great north-facing scarps of the Il, Emuk, and Kaban Ranges to the lower slopes of the Central Highlands is a wide valley-like area whose subdued topography is in marked contrast with the high and rugged character of the remainder of the Feneng area. A covering of limestone talus and residual blocks occupies most of the surface, but many of the deeper streams have cut through it to expose a thick section of sediments, chiefly mudstones, dipping relatively gently toward the south. This subdued terrain is terminated northward by a prominent though not especially high standstone ridge which dips south beneath the mudstones.

Examination has shown that the mudstones grade downwards into the sandstones, the whole forming a sedimentary unit to which the name Feing group has been given—the Wok Feing being the stream in which the best section of the upper part was observed.

The whole series was not seen in one continuous section, but different parts of it are well exposed in the Wok Feing, Bok, Feneng, Kup and Ing, also in Descent Creek. From these it has been possible to work up a composite section. The total thickness so measured amounts to 3,400 feet minimum, part of the 200-250 feet of beds obscured by talus at the foot of the limestone cliffs no doubt belonging in the Feing group. This thickness is only an approximation, for outcrops showing dip are rare in the upper part owing to the prevailing massive character of the rocks, while their tendency to slipping and slumping on a large scale make even the best observations of dips a little uncertain.

The upper 2,800 feet, well exposed in the Wok Feing and the Wok Bok, are predominantly argillaceous consisting mainly of soft massive grey to blue-grey mudstones and silty micaceous mudstones, but with some thick zones of soft greenish-blue fine-grained sandy mudstones and argillaceous sandstones especially near the top. The sandstones are sometimes thick-bedded, sometimes thin-bedded, and often contain glauconite. Cone-in-cone limestone also is found on several horizons.

Towards the bottom the mudstones become darker, harder and more silty to consist largely of hard dark-grey to black silty shales, generally micaceous and frequently pyritic, medium to massive bedded and exhibiting spheroidal weathering with a yellow-brown ferruginous incrustation and giving off a strong sulphurous odour. Some of the beds are very calcareous, extremely hard and brittle.

Thin sandstone bands appear in these hard shales, becoming more important downward, and the section grades into argillaceous sandstones through a transition zone perhaps 100 feet thick.

The basal, dominantly sandstone, part of the group measures some 500 feet in the Wok Kup. No direct measurement was made in the Wok Bok because that stream plunges over a high waterfall in these rocks and is inaccessible, but from the elevation and dip the thickness would appear to be of the same order.

The sandstones are argillaceous at the top but less so downwards. The sand grains consist almost entirely of sub-angular to slightly rounded clear quartz, generally of fairly uniform size in individual beds. Glauconite is a common constituent throughout, distribution varying from even dispersion to scattered aggregation in pockets; occasionally it is so abundant as to give the rock a dark-green colour, often it is entirely absent. Thin beds of grey silty shale occur, particularly in the upper half of the sandstones. At some horizons thin grey shale streaks are conspicuous.

Bedding is generally medium to thick and mostly well defined. The strata are often fairly hard, especially at the top, with some very hard siliceous bands, but many of them are quite uncemented although tightly compacted and fall to pieces on being struck. There are also important zones of soft friable white sandstone consisting almost entirely of pure clear quartz especially towards the bottom.

Grain size is chiefly fine to medium becoming generally coarser downwards where there are some grits. Slightly waterworn pebbles of hard calcareous gritty conglomerate found in the Wok Kup downstream from the outcropping sandstones contain, in addition to abundant quartz and numerous belemnites, rounded

pebbles of hard calcareous shale and dark siliceous rock undoubtedly derived from the underlying Kuabgen group. These were not seen in place anywhere but it is believed they almost certainly come from somewhere in the basal Feing sandstones. A hard waterworn concretionary pebble containing canaliculate belemnites found among the stream pebbles at the same place is thought also to have been derived from the Kuabgen group by way of these conglomerates.

The Feing group generally is not visibly very fossiliferous. In the upper argillaceous part thin bands rich in large *Inoceramus* sp. were found in Descent Creek from a position high in the section, in the Wok Feing low in the section, and in the Woks Kup and Ing about the bottom. The mudstones contain also a fairly rich assemblage of foraminifera, which Glaessner (see p. 165) regards as establishing a Cenomanian age for the upper part of the Feing group.

In the Wok Feneng just above its junction with the Wok Wunik the belemnite *Parahibolites blanfordi* occurs fairly commonly in hard dark shales of the transition zone. Similar belemnites also were seen on about the same horizon in the Wok Ing. Foraminifera from this zone are regarded by Glaessner as indicating an Albian age.

No recognizable fossils at all were recovered from the basal sandstone formation, *in situ*, but weathered fragments of belemnites up to nearly an inch in diameter were found in the Wok Kup downstream from the outcropping sandstones. They occur among stream pebbles which included the belemnite bearing conglomerate mentioned above, some of the included belemnites being apparently the same as those found loose. Sandstone boulders with similar belemnites were observed in the Wok Ing adjacent to outcrops of lithologically similar rocks underlying the transition zone, but here again the fossiliferous deposits were not seen in place. Cylindrical holes resembling in shape and size the belemnites occurring loose in the Wok Kup, sometimes empty sometimes filled with hard clay, were observed in thin bands in the sandstones exposed in the Wok Kup fairly low in the section, and in the Woks Bok and Ing near the top. Possibly these cavities once contained belemnites, although these fossils generally seem to be more resistant than the containing strata.

In any case, as indicated previously, the belemnite bearing conglomerate is considered to have come from the basal sandstones of the Feing group. Unfortunately, while the belemnites in the conglomerates are well preserved, it has been impossible to extract them from the rock so that their features can be examined. For this reason Glaessner is unable to determine them, although he states that they have a Cretaceous rather than Jurassic aspect. Since the basal sandstones form a continuous series of strata with the transition zone which has been established as Albian, it is probable that they, too, are of that age, or very little older.

Thus the Feing group is referred to the middle Cretaceous, Cenomanian-Albian. The palaeontological sub-division of this group into Cenomanian and Albian agrees very closely with the lithological sub-division into an upper, dominantly mudstone, and a lower, dominantly sandstone, formation, except that the lithological basis would include in the upper part the hard dark shales at the top of the transition zone which however contain Albian fossils.

In thickness, fossils and general character, the Feing group is almost identical with the combined Narin and Luap formations described by Chawner from the upper Palmer River, the only difference being that the basal sandstones in the Palmer appear to be thicker though the bottom of the section was not reached, and that the transition zone appears to be thicker too, thus:—

Feneng Area.	Feet.	Upper Palmer.	Feet.
Feing group:		*Narin formation:*	
Upper, chiefly mudstone ..	2,800	Chiefly mudstone ..	2,125
Transition zone	100	*Luap formation:*	
Lower, chiefly sandstone ..	500	Transition zone ..	500
		Sandstone	825
	3,400		3,450

No contact between the Feing group and the underlying Kuabgen group was seen. However the Kuabgen group generally looks distinctly more indurated than the Feing, while the palaeontological evidence shows that there is a considerable time interval between the two groups, the uppermost Jurassic and much of the lower Cretaceous being absent. These points, together with the sharp lithological change from shales at the top of the Kuabgen to sandstones at the base of the Feing, with glauconite and gritty conglomerates containing weathered pebbles of the underlying Kuabgen group, suggest an erosional unconformity of some dimensions. In the Wok Wunik the Kuabgen shales are dipping at a higher angle than the overlying Feing beds where dips could be read; but as there is a gap of about 1,000 feet in which there are no outcrops and a still greater interval between exposures on which dips can be measured, while there is evidence in both units of increase in dip towards a maximum in the vicinity of the group boundary, this cannot be regarded as demonstrating an angular discordance. The general monoclinal conditions observed in the Feneng area give the impression that an angular divergence of no more than a few degrees at most can be expected.

Kuabgen Group.

The strata belonging to this group occupy the increasingly higher and more rugged country on the south flank of the Central Highlands. They support a number of high strike ridges, prominent among which are the Melokin and Kuabgen Ranges, the latter giving the group its name.

The upper part of the group is rather poorly exposed in the area visited and the section has been made up as a composite from outcrops inspected in the Woks Feneng and Wunik. The lower and greater part of the group however is exposed practically as one continuous outcrop in the Wok Feneng and the Bol River, which here flow through gorges not uniformly so high but almost as difficult of access as the Gim Gorge.

The highest beds seen lie about 100 feet below the top of the group and consist of hard grey silty micaceous shales with calcareous concretions, massive bedded at the top but becoming thinner bedded downwards with some very hard calcareous bands intercalated. These total about 250 feet in thickness and are followed by a gap of similar dimensions in which no outcrops were seen. Judging by the topography it is believed that this gap and also that at the top represent mainly argillaceous sediments. The next outcrops seen were hard dark-grey thin-bedded indurated-looking silty micaceous shales with hard concretionary bands and containing belemnites and *Inoceramus*. Below these are about 600-800 feet of beds, sometimes dominantly sandy, sometimes dominantly shaly, grey to greenish-brown in colour, thin to thick bedded, generally hard and often flaggy with frequent harder very calcareous bands; sometimes alternating hard sandstones, argillaceous sandstones and silty shales with some pyrite nodules. The shales often look indurated but the sandstones, though usually very hard, show no sign of alteration.

The sandstones increase in importance as the section is descended, becoming thicker and more numerous until there are some 250 feet consisting almost entirely of hard brownish-grey to greenish-brown fine grained sandstone, medium to thick bedded, with a thick hard calcareous coarse clear quartz sandstone including gritty bands containing some thick-shelled pelecypods, near the bottom.

At this stage the sequence is interrupted by structural complications in both the Wok Feneng and Wok Wunik, possibly 100-200 feet higher in the Feneng than the Wunik. In the Wok Feneng the monoclinal conditions are disturbed by two small anticlinal folds with associated faulting indicated by irregular dips and strikes, slickensides, breccias, calcite veins, and visible small faults. Similar manifestations of faulting are evident also in the Wok Wunik where, however, the traverse was not continued far enough to detect whether it is connected with folding.

No direct evidence was found to show the magnitude and nature of the faulting, but there is reason to believe that section is cut out rather than repeated, because a highly fossiliferous shale of peculiar appearance which occurs on the north side of the fault was not seen anywhere on the south side. Thus it is concluded, not very surely, that downthrow is to the south. However, the fossiliferous shale on the upthrow side is underlain by alternating

beds rather similar to those already described, suggesting that the same unstable conditions existed throughout the deposition of the strata now found on both sides of the fault, and therefore that the fault may be of relatively small dimensions.

The total thickness estimated for the upper part of the Kuabgen group is 1,710 feet with a thick coarse sandstone containing grit bands near the bottom. A conglomerate consisting of hard grey shale and sandstone pebbles in a fine sandy matrix observed in the fault zone in the Wok Wunik probably belongs here. Pebbles in this conglomerate resemble some of the hard calcareous shales and sandstones underlying the peculiar fossiliferous shales just mentioned, suggesting at least an interformational erosion interval. This, apart from the faulting, provides a convenient horizon for tentatively dividing the Kuabgen group into an upper and a lower part, the former being that already described.

The highest known member of the lower part is the above mentioned very fossiliferous shale adjacent to the fault in the Wok Feneng. A thickness of about 120 feet is exposed, with the top missing, consisting of relatively soft dark-grey shales, medium to thick bedded, silty and slightly micaceous at the top A zone perhaps 20 feet thick near the bottom contains several thin bands teeming with fossils, some with belemnites, others with large *Inoceramus* and *Buchia malayomaorica.* (Sample 215.)

Below this are about 20 feet of greensands interbedded with grey to purple-grey shales containing pyrite, belemnites, ammonites, and pelecypods (sample 219); then about 100 feet of hard thin-medium bedded flaggy silty shales and fine grained sandstones, sometimes alternating; finally grading down into a thick sandstone formation, mostly fine grained at the top and becoming coarser downwards to finish as dominantly gritty arkose conglomerates some 900 feet thick, the lowest beds seen. There are several grit beds and shale bands interspersed through the sandstones, one important dark-grey shale member near the bottom being 110 feet thick and containing *Inoceramus.*

The conglomerates are hard, cemented, well consolidated, and generally massive bedded, consisting principally of angular to sub-angular clear quartz fragments with sub-angular pebbles up to 8 inches through of coarse pink granite with clear quartz and large pink felspars, some pink felspar and rare small well rounded pebbles of grey quartzite and hard grey sandstone. There are many thick beds of grey argillaceous sandstone which weather purplish and constitute the vehicle for numerous immense landslides, especially along the Bol River the north bank of which is really a great dip-slope whose foundations are being eroded away continuously by the swift waters of the Bol.

The total thickness of the lower Kuabgen is 2,330 feet minimum, making a total for the group of 4,040 feet observed, with an unknown amount of section missing through faulting and the

base not having been reached. The Wok Feneng was traversed with greater and greater difficulty upstream until what seemed like a definite reversal in dip was encountered. Subsequent observations from Kuabgen Range indicated that this was not the case and that no more than a small local fold occurs there. However, at the point reached the gradient of the stream exceeds 300 feet per mile and no pebbles were found other than the sandstones and conglomerates already known. Consequently it is considered that very little if any more section is exposed in the Feneng, and at any rate nothing below the conglomerate outcrops there.

The Kuabgen group is even less fossiliferous generally than the Feing group, but macro-fossils are visible on several horizons. Belemnites were seen in two zones in the upper part, both in the Wok Feneng; one from dark-grey flaggy argillaceous siltstone or fine sandstone about 1,000 feet down in the section, the other from hard dark thin bedded shale containing concretions, about 400 feet higher, where they are associated with *Inoceramus*. Glaessner has determined the belemnite from the latter outcrop to be *Belemnopsis gerardi*.

As mentioned previously a shale band about 20 feet thick in the upper part of the lower Kuabgen group contains thin very richly fossiliferous layers. One of these is teeming with belemnites recognized by Glaessner as *Belemnopsis gerardi*, another is practically built up of pelecypods which he considers are *Buchia malayomaorica* with some large *Inoceramus* sp. Immediately underlying are alternating beds one of which, a pyritic concretionary greensand, contains *Belemnopsis* cf. *indica*, *Meleagrinella braamburiensis* and a few indeterminate ammonites.

The thick shales towards the bottom of the exposed section contain *Grammatodon* (*Indogrammatodon*) *virgatus* and a few *Inoceramus* sp.

Glaessner considers that the palaeontological evidence demonstrates an Oxfordian age for the *Buchia-Belemnopsis* beds and a possibly Callovian age for the underlying *Echinotis* and *Grammatodon* beds, making the Kuabgen group generally Upper Jurassic.

Since the base of the Kuabgen group has not been reached anywhere in this part of New Guinea, there is no direct evidence of the character of the immediately underlying rocks. However, since the lowest strata seen consist almost entirely of a considerable thickness of fresh looking and only slightly rounded granite derivatives which become coarser grained as the section is descended, it is believed that the granite surface which furnished these sediments was situated near-by and that in all probability granite basement underlies the Kuabgen conglomerates at no great depth.

This situation occurs in the Chimbu area, some 250 miles to the east, where Noakes (1939) reports that a very thick section of Mesozoic rocks rests directly on granite, palaeontological examination setting the age of the basal sediments at Upper Jurassic.

IGNEOUS BOULDERS.

Numerous well rounded pebbles and boulders of a dense igneous rock with large augite or hornblende crystals in a light-grey ground mass, possibly andesitic, occur in the Bol River and further down in the Wok Feneng. The source of the boulders was not found but as they do not occur as components of any of the sedimentary rocks in the area, it is inferred that they come from dykes in the upper Bol valley.

Notes on Mesozoic Geological History.

Mesozoic rocks are known from a number of widely scattered points in New Guinea, principally along the Central Highlands. These occurrences have been listed by Glaessner (1943) who has discussed their correlation. He suggests that in Jurassic times, part of western and central New Guinea was a geosynclinal area which extended possibly into eastern New Guinea.

The information generally is very scanty, a big proportion of the occurrences being known only from stream pebbles and very few good sections having been inspected. Most of the information so far obtained is barely sufficient to give an idea of distribution, and provides little basis for deductions concerning geological history.

Although still meagre, more is known perhaps of that part of the Central Highlands which includes the Feneng area than of any other region in New Guinea.

Data presented in this paper indicate that the oldest Mesozoic sediments seen in the Feneng area, arkose conglomerates grits and sandstones of the lower Kuabgen group, Callovian in age, in all probability lie very close to granite basement. In the Feneng region generally, Callovian fossils have been reported from the Strickland River about 50 miles south-east of the Wok Feneng, from the Sepik River about 50 miles north, and from the Digoel River 70 miles north-west. Pre-Callovian also has been reported from the Strickland.

The character of the lower Kuabgen group suggests that the immediately adjacent land surface had been eroded down to granite basement prior to the beginning of Kuabgen deposition. Hence it seems likely that the Feneng area itself was dry land during most of lower Mesozoic times at least. The distribution of Upper Jurassic rocks in the region suggests that a Mesozoic geosyncline was developed mainly north of the Feneng area and

that the granite land mass which provided the lower Kuabgen sediments lay to the south and south-west, possibly connected with the Australian shield.

The subsidence which initiated the Upper Jurassic marine transgression in the Feneng area did not continue uniformly, fluctuations in rate of subsidence being denoted by irregular alternations in lithology, especially of the middle to upper Kuabgen deposits. The conglomerates at the base of the upper Kuabgen group are evidence of at least one important oscillation which raised the lower Kuabgen sufficiently to undergo erosion.

There is a big gap in the Feneng record between Oxfordian and Albian, the lowermost Cretaceous and possibly the uppermost Jurassic being absent. Representatives of some of the missing stages have been reported from the Sepik River, the Om and the Strickland. Possibly uplift of the southern marginal area of the geosyncline during the early Cretaceous at least, favoured denudation of whatever post-Oxfordian strata may have been deposited, before renewed submergence in Albian time started deposition of the Feing group.

Waterworn pebbles of Kuabgen type occurring in the basal Feing sandstones indicate some erosion of the Jurassic strata, while the general quartz sandstone nature of these basal beds, with frequent subangularity of grains, indicates that once again a granite land area was the principal source of the sediments. This idea is supported also by the abundant glauconite in the Feing group.

Subsidence seems to have been more uniform and widespread in the upper Feing, resulting in the basal sandstones grading into mudstones which persisted, with relatively minor intercalations of sandstone, through a considerable thickness of strata and occupying at least a large part of Cenomanian time.

Another big time gap occurs between the Cenomanian and Tertiary. Here there is some slight evidence of a long period mainly of non-deposition. Possibly during this period major regional subsidence resulted in this area being covered by deep water far removed from land and in which conditions were not favourable to abundant marine life.

A striking feature of the whole Mesozoic section in the Feneng area is the universal prevalence in the sandstones and grits of clear quartz grains, most frequently only partially rounded. There seems to be little doubt that the Feing and Kuabgen groups were derived almost entirely from a granitic source, with relatively minor amounts of material eroded from already deposited Mesozoic sediments.

As indicated above, the Feneng area appears to have been located about the southern margin of an Upper Mesozoic geosyncline with a granite land surface extending to the south and south-west. The absence of any appreciable angular discordance

between the lithological units where big time breaks are shown by palaeontological studies, proves that this area was only slightly affected by the intense orogenic movements experienced in other parts of the south-west Pacific at the end of the Jurassic and Cretaceous Periods.

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Explanation of Plate.

PLATE V.

FIG. 1.—Looking south from Observation Hill, showing the Gim Gorge of the Fly River between the Emuk and Il Ranges. Precipitous scarps 1,500-2,000 feet high held up by Tertiary limestones. Lower, more subdued topography typical of Feing mudstones (Cretaceous).

FIG. 2.—Topography developed in Kuabgen group. Long dip slopes and strike ridges. Melokin Range in middle distance, towering scarp of Kaban Range, Tertiary limestone, in background. View from Kuabgen Range looking east-south-east across Feneng and Bol Valleys.

FIG. 3.—Looking north through the mouth of the Gim Gorge into the Feneng area, showing the almost vertical limestone walls, 1,500 feet high, and the boulder-strewn channel of the Fly River at the base.


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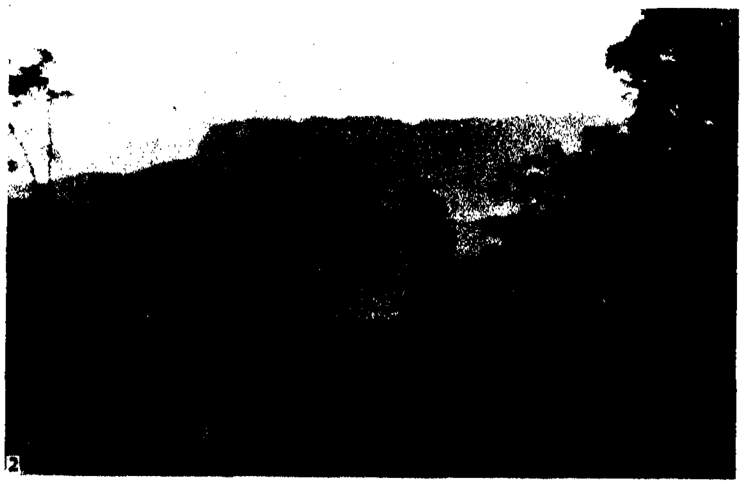
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[PROC. ROY. SOC. VICTORIA, 56 (N.S.), PT. II., 1945.]

ART. X.—*Mesozoic Fossils from the Central Highlands of New Guinea.*

By M. F. GLAESSNER, Ph.D.

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[Read 9th December, 1943; issued separately 30th June, 1945.]

Abstract.

Upper Jurassic and middle Cretaceous mollusca from Central New Guinea are described, including genera and species known from the Upper Jurassic of north-western India and of the East Indies (*Buchia-Belemnopsis* fauna), from the Upper Albian and Cenomanian of southern India and from the Aptian-Albian of Australia. Lists of foraminifera are given and the stratigraphic position of fossiliferous Mesozoic sediments of Papua and New Guinea is discussed.

Introduction.

The samples of fossiliferous rocks and fossils described in the following communication were collected in 1938-1940 by geological field parties engaged in reconnaissance surveys on behalf of Island Exploration Company and Australasian Petroleum Company. These parties were led by Dr. W. D. Chawner, Mr. N. Osborne, and Dr. S. W. Carey. A small number of fossils collected in 1939 by Mr. L. C. Noakes, then Assistant Government Geologist of the Territory of New Guinea, have also been studied.

For detailed accounts of field observations in the Mesozoic sediments of Papua, including localities at which rock samples and fossils were collected, reference should be made to publications by N. Osborne (1944), and S. W. Carey (1944). The author has discussed recently general questions of stratigraphic correlation in a wider area (Glaessner, 1943).

The fossils described in the following account were taken from the Kuabgen group (Upper Jurassic) and the Feing group (Albian-Cenomanian) which form a sequence of strata 7,500 feet thick in the Fly River headwaters in Western Papua, from the two lower divisions of the "Wahgi Series" (Jurassic, Aptian-Albian) of the Chimbu-Mt. Hagen area, Territory of New Guinea, and from the Lower Cretaceous Purari formation on the Middle Purari River, Papua (see map). Type specimens have been deposited in the collection of the Geology Department of Melbourne University, and representative fossils and rock samples will be forwarded to the Commonwealth Geological Collection, Canberra.

The writer wishes to express his gratitude to Mr. N. Osborne and Dr. S. W. Carey for valuable material and useful information placed at his disposal, to Dr. F. W. Whitehouse for the generic determination of one of the fossils, to Dr. N. H. Fisher, former Government Geologist, Territory of New Guinea, for permission to quote from an unpublished report by L. C. Noakes, and to the Directors of the Island Exploration Company and Australasian Petroleum Company for permission to publish this contribution.

Jurassic Fossils.

FORAMINIFERA.

A small number of foraminiferal tests representing the genera "*Cristellaria*", *Nodosaria, Dentalina* and *Epistomina* occurs in the dark shales of the Kuabgen group of the Upper Fly River (samples 215, 213). These are generally the most common genera of foraminifera occurring in Upper Jurassic clays and shales.

MOLLUSCA.

1. **Grammatodon (Indogrammatodon) virgatus** (J. de C. Sowerby).

(Pl. VI., figs. 1a-b.)

Cucullaea virgata J. de C. Sowerby, 1840. Trans. Geol. Soc. (2), vol. 5, pl. 22, figs. 1-2.

Grammatodon (*Indogrammatodon*) *virgatus*, L. R. Cox, 1937. Proc. Malacol. Soc. London, vol. 22, p. 195, pl. 15, figs 8, 9.

Grammatodon (*Indogrammatodon*) *virgatus*, L. R. Cox, 1940. Pal. Indica., ser. 9, vol. 3, pt. 3, p. 74, pl 2, figs. 22-30.

Material.—A single specimen, almost complete, both valves preserved but distorted by dorso-ventral compression.

Occurrence.—Black shale, lower part of Kuabgen group, about 3,300 feet below the top (sample 252).

Description.—The characters of this specimen agree with *G. virgatus* as redescribed by Cox. The main distinguishing features of the subgenus *Indogrammatodon*, the inequilateral shape and the difference in ornamentation of the two valves are clearly visible. The radial ribs in the left valve are stronger and more widely spaced. The umbones are placed at about the anterior two-fifths of the length. About 18-20 ribs are visible in the left valve anterior to the rounded carina, and about 16 are distinguishable on the anterior half of the right valve, with a few finer riblets intercalated between the 8th to 12th ribs. About 12 less distinct postero-ventral ribs are also recognizable. The posterior area of the right valve bears two or three radial threads.

The large number of radial ribs, their shape and distribution and other well preserved characters of ornamentation agree with *G.* (*I.*) *virgatus*, rather than with the similar *G.* (*I.*) *egertonianus* (Stoliczka). As far as distortion does not interfere with measurements, they are in agreement with *virgatus*, particularly the position of the umbones. *G.* (*I.*) *egertonianus* is more inequilateral.

Measurements.—Length of hinge margin 33 mm., umbo about 13-14 mm. from the anterior end of the hinge margin; height uncertain, probably more than 15 and less than 20 mm.

Age.—According to L. R. Cox, *G.* (*I.*) *virgatus* ranges from the *macrocephalus*-beds of the Lower Chari of Kachh, north-western India (Upper Bathonian or Lower Callovian) through the Middle Chari (Callovian) and the *athleta*-beds to the lower Dhosa Oolite of Lower Oxfordian (Upper Divesian) age.

2. **Meleagrinella braamburiensis** (Phillips).

(Pl. VI., figs. 2-4.)

Avicula braamburiensis nom. nud., J. de C. Sowerby, 1829, in: Murchison. Trans. Geol. Soc., (2), vol. 2, p. 323.

Avicula braamburiensis, Phillips, 1829. Ill. Geol. Yorkshire, p. 140.

Pseudomonotis braamburiensis, Douglas and Arkell, 1932. Quart. Journ. Geol. Soc., vol. 88, p. 163, pl. 12, figs. 5, 6.

?*Aucella* sp., Wandel, 1936, N. Jahrb. f. Min., Beil.-Bd. 71, (B), p. 461, fig. 1a-c.

Material.—Numerous closely-packed small single valves, about 24 examined.

Occurrence.—Black sandy shale, with *Belemnopsis* cf. *indica*, lower part of Kuabgen group (sample 219). About 40 feet below the *Buchia*-bed.

Description.—" Left valve moderately flattened, much less inflated than in *Pseudomonotis echinata* (Sow.), ornamented with some 25-30 fine thread-like ribs, which are faintly knotted at long intervals where crossed by some of the more prominent of the indistinct growth lines. The ribs are separated by wide, flat sulci, at least three to four times as wide as the ribs, and between every pair is a still finer secondary rib. The ornament is essentially radial, very little concentric element entering into it. Umbo small, much less tumid than in *P. echinata*, salient about 1½ mm. dorsal to the hinge-line.

Right valve nearly flat, but with surface rising slightly towards the umbo, which is not salient dorsal to the hinge line. Ornament as in the left valve, but more reticulate, owing to the concentric growth lines being more visible Auricles small, the ribs covering them in both valves." (Douglas and Arkell).

Measurements.—Height about 16-17 mm., length about 9-14 mm. (left valves).

The available material from the Jurassic of Central New Guinea agrees well with *M. braamburiensis* rather than with the typical wide-ranging *M. echinata*, mainly in the characters of the left valve which is less inflated, with "essentially radial" ornamentation. The right vales are smooth or show only faint traces of radial threads and weak concentric growth lines. The new specimens also resemble a form considered by Wandel as an "*Aucella*" belonging to the group of *A. malayomaorica* Krumbeck. The strongly-developed angular posterior auricle, the straight hinge margin and the deep, narrow byssal notch agree with *Echinotis* and distinguish these shells from *Buchia*. The concentric ornament is much reduced, as in *M. braamburiensis*.

Measurements.—Height about 16-17 mm., length about 9-14 mm. (left valves).

Age.—*M. braamburiensis* was described from the Lower Oxfordian of England. Wandel's "*Aucella*" comes from the middle and upper part of the Lower Oxfordian of Misol (Demú limestone and Lilintá marly limestone). L. R. Cox (1940) found the majority of his specimens of *M. echinata* from the Bathonian of Kachh closely resembling *M. braamburiensis*. He states that the stratigraphic difference which exists in England between the typical *M. echinata* (Bathonian) and *M. braamburiensis* was not observed in the Indian material.

3. **Buchia malayomaorica** (Krumbeck).

(Pl. VI., figs. 5, 6, 7*a-b*.)

Aucella plicata (non Zittel), G. Boehm, 1911, N. Jahrb. f. Min. (i), p. 13, pl. 2, figs. 1-4.

Aucella malayomaorica Krumbeck, 1923, Pal. v. Timor, Lfg. 12, Abh. 20, p. 65, pl. 2, figs. 2-12, 17; pl. 6, fig. 13.

Aucella plicata (non Zittel), Trechman, 1923. Quart. Journ. Geol. Soc., vol. 79, p. 266, pl. 17, figs. 4-8.

Pseudomonotis sp., Broili, 1924. Wet. Mededeel., vol. 1, p. 10, figs. 10, 11.

Aucella boehmi Marwick, 1926. Trans. N.Z. Inst., vol. 56, p. 305, pl. 71, figs. 10-13.

Aucella plicata (non Zittel), Kruizinga, 1926. Jaarb. Mijnw., vol. 54, Verh., pt. 1, p. 17.

Buchia boehmi, Marwick, 1934. Proc. Fifth Pacif. Sci. Congr., p. 949.

Aucella malayomaorica, Krumbeck, 1934. N. Jahrb. f. Min., Beil.-Bd. 71. (B), p. 446ff., 462.

Aucella malayomaorica, Wandel, 1936. N. Jahrb. f. Min., Beil.-Bd. 75, (B), p. 456, pl. 15, figs. 5, 6; pl. 17, figs. 1-11.

Buchia malayomaorica, Teichert, 1940. Journ. Roy. Soc. W. Austr., vol. 26, p. 109.

Buchia malayomaorica, Glaessner, 1943. Proc. Roy. Soc. Vict., vol. 55, pt. 1, p. 45.

Material.—Numerous right and left valves, about 24 specimens examined.

Occurrence.—Black shale with *Inoceramus* and *Belemnopsis gerardi*, top of lower division of Kuabgen group (sample 215), locally forming a shell breccia. Also in dark-red to chocolate-coloured shale, about 2,700 feet above base of Chimbu-Wahgi section (Lower Wahgi valley, Noakes coll., sample 57) and in similar stratigraphic position in green calcareous shale 18 miles east of Mt. Hagen aerodrome (Noakes coll., sample 78). *Buchia malayomaorica* has been described from Timor, Rotti, Jamdena, Ceram, Boeroe, the Soela Islands, Misol, Boeton, East Celebes, Western New Guinea (Itebere R., Kamoendan River headwaters, Amberbaken district) and New Zealand (Locality 1193, West of Waikiekie Stream, Kawhia Harbour).

Description.—This species was fully described by Krumbeck (1923), Marwick (1926), and Wandel (1936). The new specimens agree with these descriptions. The outline of the shell shows little variation. The anterior and posterior margins of the valves are nearly parallel ("forma typica"). The approximately rectangular outline in this species differs markedly from the oblique shape of typical representatives of the genus. The surface ornamentation is variable. Krumbeck observed this variability and stated that almost all right valves showed radial as well as concentric ornamentation while only rare left valves had distinct radial ribs. In the present material variability of the radial ribs affects both valves about equally.

Measurements.—Adult valves are about 30 mm. high and about 20 mm. long, but the ratio is variable.

Age.—Upper part of Lower Oxfordian or lower part of Upper Oxfordian. (Approximately zone of *Cardioceras cordatum* ?).

4. **Inoceramus** sp.

Inoceramus occurs in at least two horizons in the Kuabgen group (samples 215, 213) but the available material is not sufficiently well preserved to permit specific identification. Fragments of large shells resemble *I. haasti* Hochstetter as well as *I. subhaasti* Wandel and *I. galoi* G. Boehm. Fragments of *Inoceramus* occur with *Buchia malayomaorica* in the Chimbu-Wahgi section (Noakes' sample 57).

5. **Belemnopsis gerardi** (Oppel).

(Pl. VI., figs. 8, 9*a-b*.)

Belemnites gerardi, Oppel, 1865. Pal. Mitt. a.d. Mus. d. Bayer. Staates, pl. 88, fig. 1.

Belemnites gerardi, Uhlig, 1910. Pal. Indica, ser. 15, vol. 4, p. 386, pl. 93.

Belemnopsis gerardi, Kruizinga, 1921. Jaarb. v. h. Mijnw., vol. 49, Verh. pt. 2, p. 163, pl. 1, fig. 1, 3.

Belemnites gerardi, Broili, 1924. Wet. Mededeel. vol. 1, p. 8, pl. 2, fig. 9.

Belemnopsis gerardi, Stolley, 1929. Pal. v. Timor, Lfg. 16, Abh. 29, p. 151, pl. 248, figs. 16-32, pl. 249, figs. 1-3.

Belemnopsis gerardi, Spath, 1933. Pal. Indica, n.s., vol. 9, Mem. 2, pt. vi., p. 660ff.

Belemnopsis gerardi, Spath, 1939. Pal. Indica, n.s., vol. 25, Mem. 1, pt. iii., p. 135.

Material.—Four well-preserved specimens and about 20 fragments.

Occurrence.—Abundant in black shale with *Buchia malayomaorica* and *Inoceramus*, top of lower division of Kuabgen group (sample 215), also in upper division, about 1,100 feet higher (sample 213).

Remarks.—This is a controversial species. Without detailed examination of large numbers of well-preserved specimens and comparison with the holotypes of several similar named species which are evidently variable and overlap morphologically, nothing useful can be added to the controversy about the synonymy of this group. The new specimens agree with some of those figured by Uhlig from the Spiti shales (l.c. pl. 93, figs. 7, 9), by Kruizinga from Taliaboe and Mangoeli, Soela Islands, and by Stolley from Timor. Broili figured a specimen from Western New Guinea (Kamoendan River headwaters) as *B. gerardi*. While resembling the present material in its general character it differs in shape, having its greatest width below the middle of the length of the guard, as in *B. taliabutica* (G. Boehm). *B. alfurica* G. Boehm and a similar form described by Teichert from Broome, Western Australia, as *B. cf. alfurica* have a deeper ventral groove, a more circular transverse section, slender shape and narrower alveolar part.

Age.—Notwithstanding the controversy about the synonymy of *B. gerardi* and the age of its holotype, this fossil is a valuable stratigraphic marker for the Oxfordian in the eastern part of the Sunda archipelago. Abundant occurrence like that observed in the *Buchia-Belemnopsis* bed of the Kuabgen group is recorded from the Waï Galo beds of the Soela Islands. This important fossiliferous horizon is assigned by Spath to the *cordatum*-zone of the Oxfordian and its stratigraphic position is close to that of the Belemnite beds at the base of the Spiti shales in the Himalaya. In his recent discussion of *B. gerardi*, Spath came to the conclusion that its range is Upper Jurassic (and possible Lower Neocomian).

6. **Belemnopsis** cf. **indica** Kruizinga.

cf. *Belemnopsis indica*, Kruizinga, 1921. Jaarb. Mijnw., vol. 49, Verh. pt. 2, p. 171, pl. 3, fig. 1-3.

cf. *Belemnopsis indica*, Stolley, 1929. Pal. v. Timor, Lfg. 16, Abh. 29, p. 165, pl. 250, figs. 7-10.

cf. *Belemnopsis indica*, Kruizinga, 1931. Leidsche Geol. Mededeel., vol. 5, p. 369, 377.

cf. *Belemnopsis indica*, Stolley, 1935. N. Jahrb. f. Min., Beil.-Bd. 73, Abt. B. p. 50.

Material.—Two fragmentary rostra, apical portion not preserved.

Occurrence.—Sandy shale, with *Meleagrinella braamburiensis*, lower part of Kuabgen group (sample 219). About 40 feet below the bed with *Buchia* and *Belemnopsis gerardi*.

Remarks.—This species is characterized, according to Kruizinga, by the shape of its rostrum. The greatest width is in the middle, and the dorso-ventral diameter is 20 per cent. shorter than the transverse diameter. These features are clearly recognizable in the two available fragments which are quite unlike any of the numerous fragments of B. gerardi from a slightly higher horizon. They resemble however *B. calloviensis* (Oppel) as figured by Spath (1927, p. 6, pl. 1, fig. 7).

Age.—*B. indica* is known from the Oxfordian of Taliaboe and Rotti and the "Lower Oxfordian" of Boeroe, Mangoli and Misol.

Cretaceous Fossils.

FORAMINIFERA.

Feing group.—A rich and varied foraminiferal fauna occurs in the argillaceous rocks of the Feing group. Only preliminary determinations are at present available. They indicate clearly late Lower Cretaceous to early Upper Cretaceous age.

The lowest fossiliferous sample (210) contains the following fauna:—

Trochamminoides sp.
"*Cristellaria*" sp.
Marginulina spp.
Nodosaria sp.
Lagena sp.
Pleurostomella sp.
Gyroidina nitida Reuss.
Anomalina sp.
Globigerina infracretacea Glaessner.

The occurrence of *Pleurostomella* is important as this genus is not known in earlier than late Albian beds. The assemblage does not contain any distinctive Upper Cretaceous elements.

It is followed by a rich fauna occurring in numerous samples from the higher part of the Feing group. This fauna includes:—

Rhizammina sp.
Ammodiscus sp.
Haplophragmoides sp.
Trochamminoides sp.
Ammobaculites sp.
Textularia washitensis Carsey.
Textularia rioensis Carsey.
Dorothia filiformis (Berthelin).
Dentalina communis d'Orbigny.
Nodosaria affinis Reuss.
Nodosaria obscura Reuss.
Nodosaria soluta Reuss.
Tristix excavata (Reuss).
Lenticulina sp.
Marginulina sp.
Saracenaria sp.
Globulina lacrima Reuss.
Buliminella sp.
Bulimina reussi Morrow.
Pleurostomella subnodosa Reuss.
Gyroidina nitida Reuss.
Anomalina spp.
Globigerina infracretacea Glaessner.
Globigerina spp.
Globotruncana aff. *appenninica* O. Renz.

The lowest occurrence of this fauna is reported from a horizon 1,300 feet above the base of the Feing group (sample 224). The composition of the assemblage suggests Cenomanian age. Some of its species, particularly *Textularia washitensis* occur also in the shales with Cenomanian ammonites at Mingenda in the Wahgi valley and in "Stage 3" of the Chimbu-Wahgi section (see below p. 166). *Globotruncana* aff. *appenninica*, a single-keeled species of this typical Upper Cretaceous genus, with inflated chambers, appears to be a world-wide marker for Cenomanian. It has not been recorded yet from elsewhere in New Guinea.

2. Purari formation.—The foraminiferal fauna of the Purari formation is generally rather poorly preserved. It appears to be uniformly distributed throughout the sections exposed in Paw Creek (see Carey, 1944). The following preliminary determinations have been made:—

Rhizammina sp. (common).
Ammodiscus sp.
Haplophrammoides sp. (common).
Dorothia gradata (Berthelin) (common).
Lenticulina gaultina (Berthelin) (frequent).
Lenticulina sp.
Astacolus sp.
Vaginulina sp.
Planularia sp.
Marginulina spp.
Nodosaria sp.
Lagena apiculata Reuss.
Globulina sp.
Buliminella sp.
Gyroidina aff. *nitida* Reuss.
Epistomina sp.

The general composition of this fauna agrees with assemblages found in the upper part of the Lower Cretaceous (Aptian or Albian). It resembles the foraminiferal fauna of the lower part of the Feing group; *Pleurostomella* and *Globigerina* are however absent from the Purari fauna.

MOLLUSCA.

THE MOLLUSCA OF THE FEING GROUP.

Pseudavicula sp.

Material.—Numerous valves (about 20-30), both right and left, mostly preserved as internal and external casts, with fragments of the shell attached.

Occurrence.—Dark shale of the Feing group (samples 210, 239), about 500 feet above base, with *Parahibolites blanfordi.*

Description.—Shell small, suborbicular, inequilateral, compressed, test very thin, often wrinkled by rock pressure. Umbo small, very little projecting, sub-central in relation to the greatest length of the valve. Dorsal margins straight, antero-dorsal margin long, slightly convex, forming a blunt angle with the broadly rounded ventral and posterior margin. Posterior auricle large, with a distinct dorsal rim, posterior margin convex. Surface covered with numerous blunt radial ribs, unequal in width, with narrow smooth interspaces.

The large size of the anterior portion of the shell appears to be a distinctive feature of these fossils but the available material is not well enough preserved to permit a more detailed description and identification.

Age.—Upper Albian.

Inoceramus sp.

Fragments of large shells representing an undetermined species of *Inoceramus* occur in the type area of the Feing group (samples 212, 239, 209) and also in the Palmer River area, 20 miles east-south-east (Chawner coll., samples 14, 121).

Turrilites aff. **costatus** Lamarck.

Material.—A distorted and partly crushed fragment of a single whorl.

Occurrence.—Feing group, basal part of Narin formation (Chawner coll., Palmer River, sample 115).

Remarks.—This fragmentary specimen resembles *T. costatus* Lamarck and also *T. acutus* Passy which according to Spath is connected with Lamarck's species by innumerable passage forms. *T. costatus* is known from the Cenomanian of Europe, North Africa, Palestine, Zululand, Madagascar and Southern India (Middle Utatur group). *T. acutus* is known from the Cenomanian of France, Northern Germany, North Africa and Natal and the "Vraconnian" of Mexico.

Parahibolites blanfordi (Spengler).

(Pl. VI., figs. 10*a-c*.)

Belemnites fibula (pars), Blanford, 1861, The foss. Cephalop. of the Cret. rocks of S. India. Pal. Indica., ser. 1, p. 3, pl. 1, figs. 14, 16-19, 24-34, 41; pl. 2, figs. 5, 6 (non *B. fibula* Forbes).

Belemnites n.sp., Kossmat, 1897. Rec. Geol. Survey of India, vol. 30, pt. 2, p. 87.

Pseudobelus blanfordi Spengler, 1910. Beitr. z. Pal. u. Geol. Oesterr.-Ung. u.d. Orients, vol. 23, H.3, p. 155, pl. 12, fig. 6, pl. 14, fig. 6.

Parahibolites blanfordi, Bülow-Trummer, 1920. Fossilium Catalogus i., pt. 11, p. 164.

Material.—A single well-preserved rostrum.

Occurrence.—Dark shale of Feing group, 500 feet above base, with *Pseudavicula* sp. and smaller foraminifera (sample 210).

Description.—" Guard elongated, compressed, columnar or lanceolate, acutely pointed behind on the frontal aspect. Section oval or oblong. Ventral surface evenly rounded with a very short furrow at the anterior extremity. Sides more or less flattened, having in some specimens a shallow sulcation, most distinct in front; marked very distinctly with a double vascular impression, which generally extends the whole length of the guard. The alveolar cavity very acute, and extending in all the specimens examined, considerably more than half the length of the guard. It is somewhat eccentric, particularly in very compressed specimens." (Blanford).

Remarks.—The laterally compressed shape, short ventral groove, and well-developed straight lateral lines over the whole length of the Feing specimen agree well with the species described by Blanford as *B. fibula*.

Age.—This species is known only from the Lower Utatur group of southern India, zone of *Stoliczkaia dispar*, Upper Albian (" Vraconnian ").

THE MOLLUSCA OF THE PURARI FORMATION.

A rich fauna of mollusca was obtained by Carey in the area occupied by the sediments of the Purari formation. The majority of samples taken from outcrops contain only smaller foraminifera and other microfossils (holothurian plates, ophiuran vertebral ossicles, ostracodes) and undeterminable echinoid remains. One bed in the upper part of the exposed section is rich in *Exogyra* aff. *couloni* and contains also *Ostrea* sp. and a small number of undetermined lamellibranchs and gastropods. Numerous pebbles and boulders of a blue, hard sandy limestone or calcareous sandstone collected in the creeks in this area are extremely rich in mollusca. This " molluscan bed " has not been seen in situ in the type area of the Purari formation (Paw Creek). Carey (1944) states that " the horizon of the molluscan material cannot be very different from that of the *Exogyra* bed."

Owing to limitations of available time and facilities the present writer has not yet been able to carry out a complete study of this rich fauna. A list of a few distinctive forms follows, and the most abundantly occurring species among them is described, together with the *Exogyra* and a belemnite, a perfect specimen of which was found in a loose block of sandstone.

The fauna includes *Lingula* cf. *subovalis* Davidson, *Trigonia* sp., *Cardium* sp. *Ptychomya* sp., *Pseudavicula papyracea* Etheridge, *Ostrea* sp., *Mytilus* sp., *Nerinea* sp., *Alaria* (*Anchura*) cf. *wilkinsoni* Etheridge, ?*Praestriaptychus* sp., *Tetrabelus macgregori* n. sp.

1. **Pseudavicula papyracea** R. Ethridge, jun.

(Pl. VI., fig. 11.)

" Undetermined bivalve ", R. Etheridge, jun., 1892. Geol. Pal. Queensland, p. 482, pl. 21, fig. 14.

Pseudavicula papyracea, R. Etheridge, jun., 1907. Rec. Austral. Mus., vol. 6, No. 5, p. 319.

Material.—Large numbers of more or less well preserved specimens.

Occurrence.—Abundant in calcareous sandstones rich in mollusca, Purari formation, Paw Creek, and Wabo Creek, Middle Purari valley (not found in situ). Similar forms occur also in " Stage 2 " of the Chimbu-Wahgi section, Lower Wahgi valley (Noakes coll., sample 30).

Description.—" Shell suborbicular, delicate and fragile, compressed, posteriorly, alate, test very thin, papyraceous. Left valve convex in the umbonal region, with a sharply-pointed rather elevated umbo. Right valve more depressed than the left and the umbo inconspicuous. Dorsal margins on both sides straight, those anterior to the umbo obliquely inclined, those on the posterior straight; anterior ends small, the margins rounded; posterior alations small, flat, the margins rectangular. Sculpture of microscopic concentric lines." (Etheridge 1907.)

Measurements.—In the majority of examined specimens the height varies between 15 and 30 mm.

Remarks.—The characters of the most abundant lamellibranch of the Purari molluscan fauna appear to agree well with Etheridge's description. The left valve, not figured by Etheridge, resembles his second " undetermined bivalve " (l.c. 1892, pl. 21, fig. 16) although as stated by this author, the umbo is further removed from the anterior margin in the present species. In some specimens the concentric growth lines are fairly well marked. The present writer has been unable to compare his material with Etheridge's type specimens.

2. **Exogyra** aff. **couloni** (Defrance).

Material.—Numerous specimens, mostly casts with fragments of the shell preserved. Left valve attached to various molluscan shells.

Occurrence.—A distinctive calcareous "*Exogyra*-bed," about 10 feet thick, in the upper part of the Purari formation; Paw Creek area, middle Purari valley. (Samples 130-139.)

Remarks.—The present specimens, although abundant, are rather poorly preserved. They agree in general with the description of *E. couloni* given by H. Woods ("*E. sinuata* Sowerby," H. Woods, Palaeontogr. Soc., vol. 66, 1913, p. 395, pl. 61, fig. 13, text figures 194-214). The only noticeable difference is the absence of any concavity of the posterior margin of the shell. It is generally straight. None of the specimens seen is nearly as large as the largest European representatives of the species (average length about 5 cm.).

Age.—*E. couloni* is a common fossil of the Lower Cretaceous. An *E.* cf. *couloni* was reported by Piroutet from the Lower Cretaceous (Moindou) of New Caledonia.

3. **Tetrabelus macgregori** n. sp.

(Pl. VI., figs. 12*a*-*b*.)

?*Belemnites* sp., R. Etheridge, jun., 1902. Mem. Geol. Survey N.S.W., Palaeont. Nr. 11, p. 46, pl. 9, figs. 3-5.

?*Tetrabelus* sp., F. W. Whitehouse, 1924. Geol. Mag., vol. 59, p. 413ff.

Material.—One large well-preserved rostrum, one small rostrum of similar type, and several fragments which are enclosed in hard rock.

Occurrence.—Tuffaceous and calcareous sandstones of the Purari formation, Paw Creek, Middle Purari valley. Holotype from sample 186, Paw Creek, not in situ. Also in boulders of molluscan sandstone from Paw Creek (samples 65, 107, 109) and Wabo Creek (sample 20).

Description.—The holotype of this species was examined by Dr. F. W. Whitehouse who recognized it as a new species of *Tetrabelus*. Whitehouse (l.c., 1924) established this genus for "clavate belemnites provided with dorso-lateral grooves and lateral lines, having, in addition, independent ventro-lateral grooves. Alveolus normal." In the new species the rostrum is strongly constricted in the post alveolar region and dorso-ventrally compressed, particularly where it expands again to its greatest width. Dorso-lateral grooves well developed, prominent and deep, passing at about one-third of the length of the rostrum into the less conspicuous lateral lines, the connection being not straight but ventrally curved. The lateral lines continue nearly to the apex. Ventro-lateral grooves faintly developed in the alveolar region.

Measurements.—Length 100 mm., greatest width 13 mm., dorso-ventral diameter between alveolar region and zone of greatest width 9.3 to 9.6 mm., minimum width in alveolar region 9.8 mm.

Remarks.—The writer was unable to compare the new form with the original of Etheridge's unnamed belemnite from the Aptian of New South Wales. The two specimens appear to be very similar in size and shape but Etheridge's form contracts more rapidly toward the apex. According to Whitehouse it "shows a very long ventro-lateral groove converging towards the dorso-lateral near the apex". This is not the case in the Purari specimens. Whitehouse also states that "from the figure given by Etheridge the two grooves are of almost equal strength, the dorso-lateral however being possibly a little more prominent. In *T. kleini* all grooves are of equal impress, while in *T. seclusus* the ventro-lateral is much more distinct than the dorso-lateral." From this description it appears that the new species is different from all known representatives of the genus. If Whitehouse's view of a "morphological progression" from *Dimitobelus*, without independent ventro-lateral grooves, through the known species of *Tetrabelus* is accepted, then the new species should be regarded as the most primitive form.

This species is named after Sir William MacGregor, explorer and administrator of Papua, who discovered the Cretaceous rocks on the Purari in 1894.

Stratigraphic Conclusions.

1. Fossiliferous Mesozoic Rocks of New Guinea.

The Mesozoic stratigraphy and fauna of Netherlands New Guinea were summarized by Zwierzycki (1928, 1931) in his explanations to the geological maps of that territory, and reviewed by Hövig (in: Klein 1937, pt. 2). E. R. Stanley published data on the Mesozoic rocks of the Territory of New Guinea (1923, pp. 30-31) and of Papua (1923A, pp. 25-27). Certain statements on this subject in Stanley's publications require critical comments in order to define more clearly the available data.

The age of the *Alveolina*-limestone on Mt. Wilhelmina in Netherlands New Guinea, which was mentioned by Stanley, is Eocene (Zwierzycki 1928, p. 29). The fossils reported by Richarz from the Torricelli Mountains as Cretaceous (Cenomanian) are Miocene. This was recognized by Schubert and again emphasized by Zwierzycki (1928, p. 25). The "Cretaceous *Alveolina*-limestones" of the Finisterre Mountains on the North Coast of New Guinea are actually known to be Miocene, including Middle Miocene

at the genotype locality of *Flosculinella* Schubert (Kabarang River near Cape Rigny). Stanley was probably misled by references to "chalky" limestones. The *Globigerina*-limestones in the Njau plain on the border between Netherlands New Guinea and the Mandated Territory were reported by Schubert to contain Cretaceous foraminifera, but he pointed out that these fossils are possibly not *in situ*. The "cherts containing *Actinacis sumatrensis*" described by Gregory and Trench from pebbles collected in the Fly River have not been found by Osborne on his recent expedition to the Fly River headwaters. The range of the genus *Actinacis* is now known to extend into the Oligocene. The occurrence of fossiliferous Upper Cretaceous "at the head of Karova Creek, a few miles east-north-east of Kerema" has not been confirmed in the course of geological exploration carried out in this area on behalf of Australasian Petroleum Company. Some confusion concerning the locality of Stanley's specimen, which appears to have been lost subsequently, is suspected by the present writer. All fossils found by Everill "in about latitude 7° south on the Strickland River" came from pebbles and the inclusion of this area in the Mesozoic on the geological map of Papua is not justified. Recent work by Noakes revealed evidence for Neogene age of limestones in Northern New Britain for which Cretaceous age had been assumed on lithological grounds and on the evidence of a gastropod cast determined as "*Actaeonella*" (probably *Oliva* sp.).

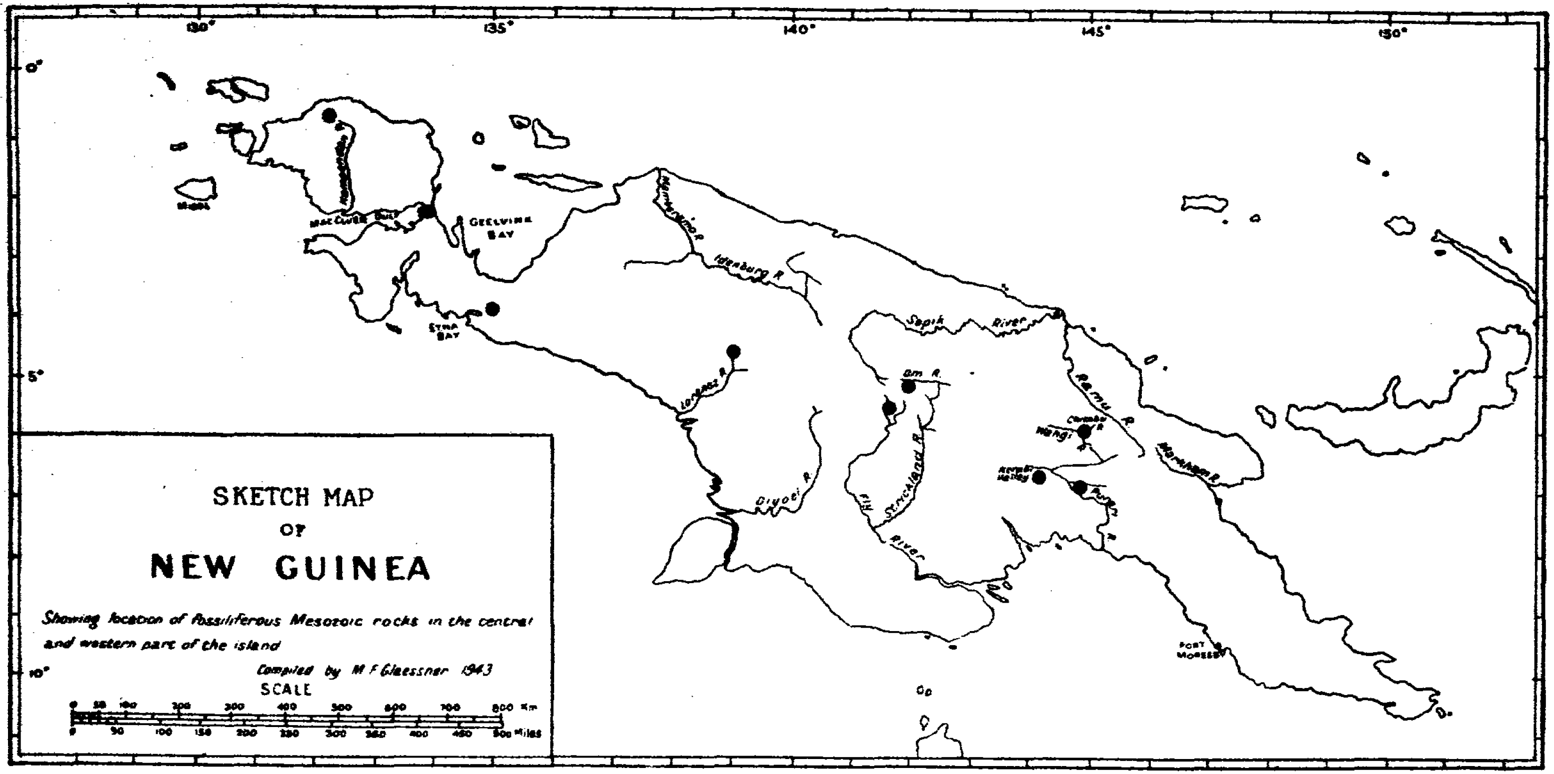
The known pre-Tertiary basement in a wide zone, including the northern coastal ranges of New Guinea, the Bismarck Archipelago, the Solomon Islands, New Hebrides, Fiji, and Tonga consists entirely of metamorphic or plutonic rocks.

The known occurrences of fossiliferous Mesozoic rocks in Papua and the Territory of New Guinea include the headwaters of the Fly, Strickland, and Sepik rivers, some of the country north of Mt. Murray (Kerabi Valley), and on the Middle Purari River, the Wahgi Valley (see map), and areas in the Owen Stanley Ranges.

2. The Age of Kuabgen Group.

The fauna with *Buchia malayomaorica* and *Belemnopsis gerardi*:—Abundant occurrence of *B. gerardi* and similar forms, together with large *Inoceramus* is a characteristic feature of Oxfordian strata in the eastern part of the Sunda archipelago. The middle part of the Jurassic sequence on the upper Fly river is therefore considered as Oxfordian. This agrees also with the distribution of *Buchia malayomaorica* at the numerous localities from which this species has been recorded. The same age is assigned to the *Buchia malayomaorica*-horizon of the Chimbu-Hagen area, about 2,700 feet above the base of the Mesozoic section described by Noakes. Pebbles with Oxfordian fossils are known from the Sepik river.

The stratigraphic range of the Kuabgen group:—The oldest Jurassic fossil found in the Fly River section is *Grammatodon virgatus*, which ranges from the *macrocephalus*-beds (Upper


SKETCH MAP
OF
NEW GUINEA
Showing location of Fossiliferous Mesozoic rocks in the central and western part of the island
Compiled by M F Glaessner 1943
SCALE
0 50 100 200 300 400 500 600 700 800 Km
0 50 100 150 200 250 300 350 400 450 500 Miles
130°
135°
140°
145°
150°
0°
5°
10°
GEELVINK BAY
MACCLUER GULF
ETNA BAY
Mamberamo R
Idenburg R
Sepik River
Ramu R
Markham R
Om R.
Strickland R
Fly River
Digoel R.
Lorentz R
Wahgi R
Purari R
PORT MORESBY

Bathonian or Callovian) to the *cordatum*-zone (Upper Divesian-Lower Oxfordian). While this range gives no direct evidence of pre-Oxfordian age of the lower Kuabgen beds, the reported occurrence of this species in lower zones of the Upper Jurassic may be significant. Callovian fossils are well known as pebbles from the rivers of the Central Highlands of New Guinea, including the Strickland and Sepik. The species *Meleagrinella braamburiensis* and *Belemnopsis* cf. *indica* from a bed below the *Buchia*-horizon are forms which apparently did not range above the lower Oxfordian. This again agrees with the assumption that the base of the Oxfordian may be above the horizon of *Grammatodon virgatus*. Callovian age of this part of the Kuabgen group is therefore not unlikely. There is little evidence of Middle Jurassic (Bathonian-Bajocian) in this part of New Guinea. It is confined to a report of *Stephanoceras* from the Strickland pebbles.

The upper part of the Kuabgen group contains only *B. gerardi*. The age of this part of the section cannot be determined directly. The occurrence of uppermost Jurassic ammonites in the Sepik pebbles, to which a record of perisphinctids of "uppermost Jurassic or lowest Cretaceous" age determined by Reeside from beds outcropping in the Om River (Strickland headwaters) can now be added (see Osborne, 1944, p. 132) indicates the probability of Tithonian occurring in the area. No definite index fossils of uppermost Oxfordian or Kimmeridgian age have been recorded from the Indo-Pacific region.

The age of the Kuabgen group is therefore Upper Jurassic (possibly Callovian to Tithonian). Some Middle Jurassic may also be present in the vicinity of the Sepik-Strickland divide, in view of the recorded occurrence of *Stephanoceras*.

3. The Age of the Feing Group.

The age of the beds with *Parahibolites blanfordi*:—The lower part of the Feing group is characterized by the occurrence 500 feet above the top of the Jurassic of a belemnite known from the Lower Utatur group of Southern India (Upper Albian, *dispar*-zone). The character of the foraminiferal assemblage found in the lower Feing agrees with this age. The lowest part of the Cretaceous section is represented by sandstones from which a loose block containing fragments of belemnites, lamellibranchs, crinoids and echinoids (sample 209) is believed to be derived. As the belemnites could not be freed from the matrix, they remain, unfortunately, undetermined. It is not unlikely that the genus *Parahibolites* is represented among them. A more calcareous portion of this sample shows some slight resemblance with the molluscan bed of the Purari formation. This sandstone block contains pebbles some of which are evidently derived from

the Kuabgen group. A large pebble of black siliceous shale found loose at the same locality contains several specimens of a canaliculate belemnite.

The age of the beds with *Globotruncana* aff. *appenninica*:— The Lower Cretaceous lower part of the Feing group passes gradually upward into more argillaceous beds containing a rich assemblage of smaller foraminifera, including Upper Cretaceous forms such as single-keeled *Globotruncana* with inflated chambers (*appenninica*-type), *Bulimina reussi, Pleurostomella subnodosa,* together with other species known from Albian and Cenomanian (*Gyroidina nitida, Textularia washitensis, T. rioensis*). *Inoceramus* and *Turrilites* cf. *costatus* occur together with this assemblage which has a distinctly Cenomanian character.

4. The Age of the Purari Formation.

The Cretaceous beds in the hills north of the Purari River, about 120-136 miles up its course, were discovered by Sir William MacGregor in 1893-4.

Only a preliminary examination of the fossils collected at the same locality by Carey in 1940 has been carried out. The foraminiferal fauna indicates approximately Aptian to Albian age. The fauna of the molluscan bed contains elements related to species from the Tambo and Roma beds of eastern Australia (Upper Albian, Aptian), such as *Lingula* cf. *subovalis, Pseudavicula papyracea, Alaria* cf. *wilkinsoni, Tetrabelus macgregori,* but in the absence of ammonites it is impossible to assign it to definite zones. The Lower Cretaceous affinities of the fauna are strengthened by the occurrence of *Exogyra* cf. *couloni* and of further mollusca resembling Australian Lower Cretaceous forms which, however, have not yet been examined in detail. Most of the larger fossils appear to be derived from the upper 1,000 feet of the Cretaceous sequence which is transgressively overlain by Eocene. If this part of the Purari formation is assigned to the Aptian or Albian, the question arises whether the lower part of the sequence could represent earlier stages of the Lower Cretaceous. The uniform character of the foraminiferal assemblage throughout the sequence makes a very great age difference between the higher and lower beds unlikely.

5. Correlation of the Purari, Feing, and Kuabgen Strata.

The Purari formation cannot be considered as an equivalent of the entire Feing group. It is possible, however, that the upper part of the Purari formation corresponds to the lower part of the Feing. The conspicuous molluscan bed of the Purari formation has been reported from a number of widely scattered localities.

A typical specimen was obtained by Mr. Ethell, Patrol Officer, in the course of a patrol between Keuri (Sarugi) Valley and Lake Tebera, 20 miles west of the type locality on the Purari. One hundred and eighty miles further west, on the Strickland River, at the highest point reached by Everill in 1885, G. Barrow collected a pebble of a bluish-green calcareous sandstone with abundant mollusca. A similar rock was found in 1939 by the late L. Vial, then Assistant District Officer, in the Wahgi Valley west of Mingenda.

A detailed study of the Lower Tertiary and Mesozoic sequence in the lower Chimbu and Wahgi Valleys, which was carried out by L. C. Noakes in 1939, proved the existence of a series of sediments over 22,000 feet thick, "in which deposition extends conformably from about Jurassic to Eocene time." (This and the following quotations are taken from an unpublished report by L. C. Noakes, dated July, 1939.) Noakes divided this sequence, which consists predominantly of shales and mudstones, with some sandstones, into five "stages". The lower two and part of "Stage 3" are of interest in conjunction with the present investigation. A dark-red to chocolate shale with *Buchia malayomaorica* and *Inoceramus* was found in "Stage 1" about 2,700 feet above the base of the section. This "stage" consists mainly of slightly calcareous and siliceous shales.

The second "stage" is characterized by an abundance of tuffaceous sandstones most of which are laminated or interbedded with shale. A volcanic agglomerate was taken by Noakes as marking the base of this "stage". Most of the samples are unfossiliferous but fragments of *Ostrea*, a *Pseudavicula* and plant remains occur in the upper 1,500 feet (samples 28-36), suggesting a correlation with part of the Purari formation. "Stage 3" consists mainly of shales and mudstones. "The Mingenda ammonite horizon is considered to lie in the lower half of this stage" (Noakes). This bed, which is exposed on Mingenda Mission aerodrome, contains well-preserved ammonites and *Inoceramus* resembling those reported by E. R. Stanley (1923, p. 26) from the Kerabi Valley north of Mt. Murray. These appear to be approximately of middle Cenomanian age (Whitehouse 1926, p. 279. The writer was informed by Dr. Whitehouse that various published references to a fauna "from the Strickland River" are based on Stanley's specimens). The Mingenda bed and its equivalents in "Stage 3" contain also *Textularia washitensis*, a foraminiferal species known from the upper part of the Feing group.

The resulting correlations are shown in the following table:—

TABLE 1.—Correlation of Fossiliferous Mesozoic Strata in New Guinea.

		Fly River Area.	Strickland River Area.	Area between Strickland and Purari Rivers.	Wahgi River Area.	Purari River Area.
		(Transgressive Tertiary limestones)				(Transgressive Tertiary Limestones)
Cenomanian		Feing Group (3,400 feet)		Kerabi beds (thickness and sequence unknown)	"Stage 3" (6,500 feet)	
Lower Cretaceous	Albian		"Fossiliferous Green-sand" (not known *in situ*)		"Stage 2" (6,200 feet)	Purari Formation (5,000 feet, base not known)
	Aptian					
	Neocomian				?	
Upper Jurassic		Kuabgen Group (4,000 feet)	Om river beds (thickness unknown)		"Stage 1" (4,500 feet)	

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Explanation of Plate.

PLATE VI.

FIG. 1*a-b*.—*Grammatodon (Indogrammatodon) virgatus* (J. de C. Sowerby). Kuabgen Group (Upper Jurassic), Fly River Headwaters, Papua. (Coll. N. Osborne, sample 252.)

FIGS. 2-4.—*Meleagrinella braamburiensis* (Phillips). Kuabgen Group (Upper Jurassic), Fly River Headwaters, Papua. (Coll. N. Osborne, sample 210.) Fig. 2—right valve, figs. 3, 4—left valves.

FIGS. 5*a-b*, 6.—*Buchia malayomaorica* (Krumbeck). Kuabgen Group (Upper Jurassic, Oxfordian), Fly River Headwaters, Papua. (Coll. N. Osborne, sample 215.) Fig. 5*a*—right valve, external view; fig. 5*b*—same valve, internal view; fig. 6—left valve, internal view.

FIG. 7.—*Buchia malayomaorica* (Krumbeck). Wahgi Series. "Stage 1" (Upper Jurassic, Oxfordian), Lower Wahgi River, New Guinea. (Coll. N. Noakes, sample 57.) Left valve, external view.

FIGS. 8, 9 *a-b*.—*Belemnopsis gerardi* (Oppel). Kuabgen Group (Upper Jurassic, Oxfordian), Fly River Headwaters, Papua. (Coll. N. Osborne, sample 215.)

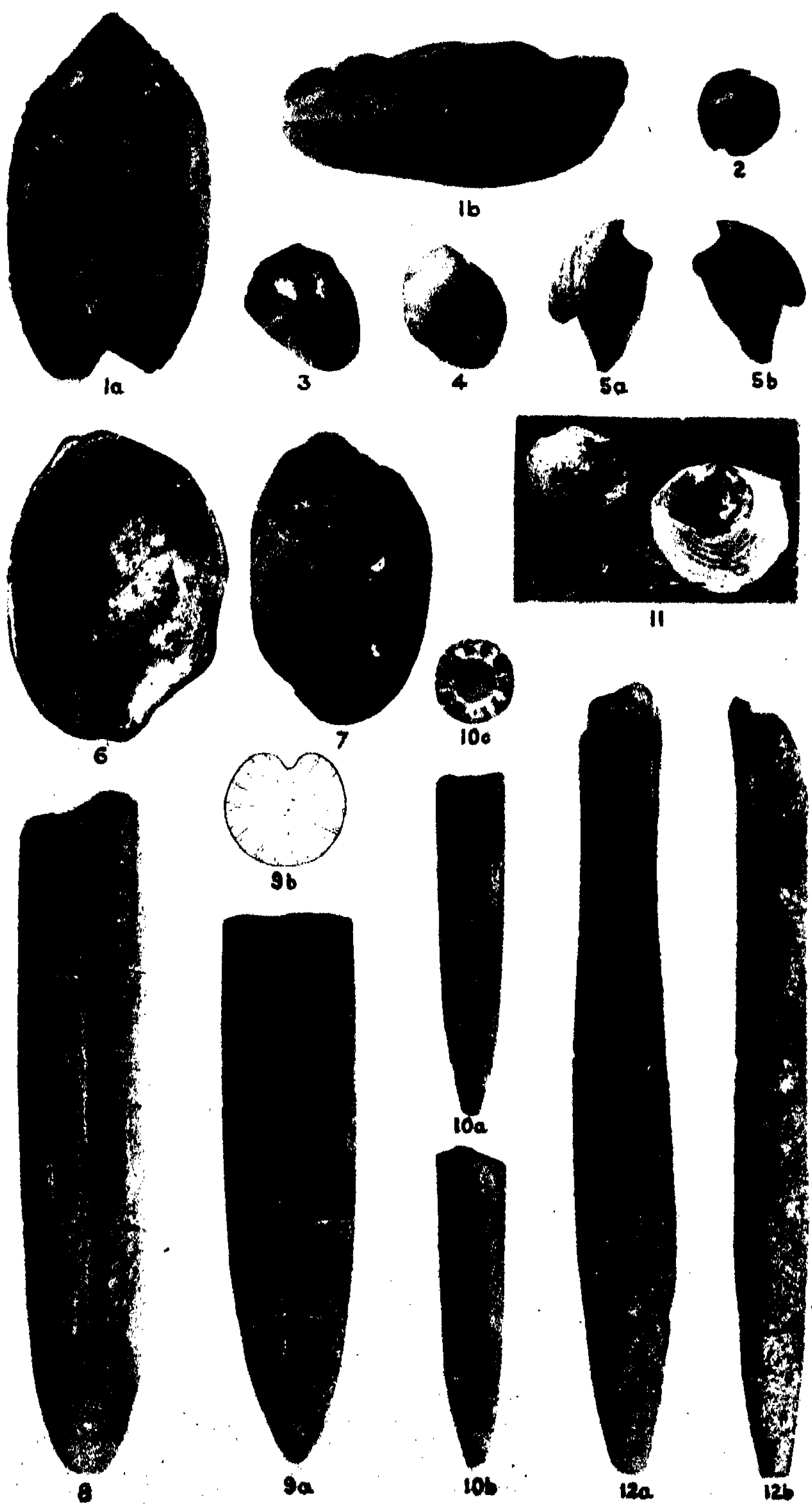
FIGS. 10 *a-c*.—*Parahibolites blanfordi* (Spengler). Feing Group, lower part (Upper Albian). Fly River Headwaters, Papua. (Coll. N. Osborne, sample 210). Fig. 10*a*—ventral view. Fig. 10*b*—lateral view. Fig. 10*c*—alveolar view.

FIG. 11.—*Pseudavicula papyracea* (R. Etheridge, jun.). Purari Formation (Aptian-Albian), Wabo Creek, Purari River, Papua. (Coll. S. W. Carey, sample 22.)

FIG. 12*a-b*.—*Tetrabelus macgregori* n.sp. Holotype. Purari Formation (Aptian-Albian), Paw Creek, Purari River, Papua. Coll. S. W. Carey, sample 186, Melbourne University, Geol. Department Reg. No. 1876).

Photographs by Miss M. L. Johnson, Melb. Univ. Geol. Dept.

All figures approximately natural size.


1a
1b
2
3
4
5a
5b
6
7
10c
11
9b
10a
8
9a
10b
12a
12b

[PROC. ROY. SOC. VICTORIA, 56 (N.S.), PT. II., 1945.]

ART. XI.—*Trilobita of the Family Calymenidae from the Palaeozoic Rocks of Victoria.*

By EDMUND D. GILL, B.A., B.D.

[Read 9th December, 1943; issued separately 30th June, 1945.]

Summary.

Four new species of trilobites—*Calymene bowiei*, *C. killarensis*, *Gravicalymene hetera*, and *G. kilmorensis*—are described, *Gravicalymene angustior* (Chapman) re-described, and notes provided on other forms. Descriptions and maps of new fossil localities are given. The bearing of these determinations on stratigraphy is discussed.

Introduction.

Trilobites of the genera treated in this paper are known in Victoria only from Upper Silurian and Lower Devonian rocks. They comprise the following species:—

Species.	*Age*	*Stratigraphical Series.*
Calymene bowiei sp. nov.	Lower Devonian	Yeringian
C. killarensis sp. nov.	Lower Devonian	Yeringian
Gravicalymene angustior (Chapman)	Lower Devonian	Yeringian
G. hetera sp. nov.	Upper Silurian	Melbournian
G. kilmorensis sp. nov.	?Upper Silurian	?Melbournian
G. cf. *kilmorensis* sp. nov.	Upper Silurian	Melbournian
Flexicalymene sp.	?Upper Silurian	?Melbournian

The determinations of fossils in this paper supersede lists previously given (Gill 1938, 1939).

Systematic Descriptions.

Family CALYMENIDAE H. Milne Edwards, 1840.

Genus CALYMENE Brongniart, 1822.

Genotype **Calymene blumenbachi** Brongniart, 1822.

Chapman referred a trilobite from Moonee Ponds Creek, Melbourne, to the above genotype (Chapman 1914, p. 219; 1915, p. 166). The specimen, which consists of thorax and pygidium only, is in the National Museum (reg. No. 452), but as the cephalon is not present, a determination is not attempted. In the 1914 paper (p. 228) *C. blumenbachi* is also recorded from "Upper Yarra". This is apparently the same specimen as was later described as *C.* cf. *blumenbachi* (Chapman 1915, p. 166, Pl. XV., fig. 11). This specimen is in the National Museum, comes from Section 12, Parish of Yering (which in this case is "Flowerfield" Quarry—Gill, 1939), and is No. 1862 of the Geological Survey of Victoria collection. Unfortunately, the preservation is poor, and determination is not attempted. Chapman also recorded "*C.* cf. *tuberculata* Salter" from Kilsyth, near Croydon

(Chapman, 1907, p. 239; 1914, p. 228), which species has since been re-named *C. nodulosa* (Shirley, 1933, p. 53). This specimen (also housed in the National Museum) consists of a few segments of the thorax only, and a determination is not attempted. Selwyn (1855-6) and Smyth (1874, p. 34) record *C. tuberculata* from "Upper Yarra". This is probably the specimen in the National Museum (reg. No. 451) which is complete but ill preserved, and labelled as being from "Yering, Upper Yarra". The matrix suggests that it originates from "North of Lilydale". The specimen does not admit of precise determination by modern standards. "*Calymene* sp." has been recorded from numerous localities, but in most instances the specimens on which the determinations were based cannot now be traced.

Calymene bowiei, sp. nov.

(Plate VII., figs. 1, 2, 6.)

Type Material.—The internal cast of a cranidium and external mould of same (syntypes) in the National Museum, Melbourne (reg. Nos. 14504 and 14505), collected from fawn mudstone at Syme's Homestead, Killara (locality 33).

Age.—Yeringian Series—Lower Devonian.

Description.—Cephalon strongly convex; of the profile shown in fig. 1A. Glabella very convex, being raised well above the level of the fixed cheeks. Glabella much wider posteriorly than anteriorly, i.e., markedly bell-shaped in outline; does not overhang pre-glabellar field; projects well forward of the fixed cheeks. Posterior glabella lobes large, squarish in outline, and joined to the middle part of the glabella by narrow bridges which are lower in level than the lobe. The bifurcated furrows in front of the posterior lobes leave small protuberances or interlobes between the posterior lobes and the middle ones. The second or middle lobes are markedly smaller than the posterior ones. They are stumpy, but not flattened on the ends as in *C. killarensis*. Opposite the second lobes the fixed cheeks draw in towards the glabellar lobes to form buttresses, but these are not flattened on the tips as they are in *C. killarensis*. The anterior lobes are small, and consist only of dorso-ventral ridges on the sides of the main body of the glabella. There are no fourth lobes. Main body of glabella much higher than lobes. Eyes opposite middle lobes. "Antennary" pits occur in the floor of the axial furrows opposite where the fourth lobes usually appear. The axial furrows are deep, wide in front, and narrow behind the buttresses. Sutures much the same as in *C. killarensis*. The inner margins of the fixed cheeks run directly posteriorly till they draw in towards the glabella to form the buttresses opposite the middle lobes. From the buttresses to the intramarginal furrows the margins curve outwards to give the general bell-shaped appearance of the glabella region. The pre-glabellar field is short, shallow, and

recurved. The recurved margin is thin, and is directed forwards and slightly upwards (fig. 1A). Posterior intramarginal furrows broad; posterior walls a little steeper than the anterior walls. Occipital ring narrows at its extremities, which turn in towards the corners of the fixed cheeks. Genal angles rounded.

Length of holotype cranidium.—21 mm.

Width from genal angle to centre of glabella.—25 mm.

Comment.—The cephalon is tuberculated, but the precise nature of the ornament is not clear because of a layer of iron oxide over the external mould (paratype). *C. bowiei* is readily distinguished from the genotype (*C. blumenbachi*). The former has a bell-shaped glabella as against the squarish outline of the latter. In the genotype, the axes of the glabella lobes run transversely whereas in the new species they are directed forwards at an angle of about 20° to the transverse. The pre-glabellar field of *C. bowiei* (fig. 1A) is of the type of *C. aspera* (*vide* Shirley, 1936, pl. XXX., fig. 10) rather than that of *C. blumenbachi* (*vide* Shirley, 1933, pl. 1, fig. 3).

A few specimens have been noted in which the pre-glabellar field is more upturned than in the holotype. A sufficient range of specimens has not been procured yet, however, to enable one to determine whether this is a varietal difference, or one due to slight compression. The free cheeks are missing from the holotype, but

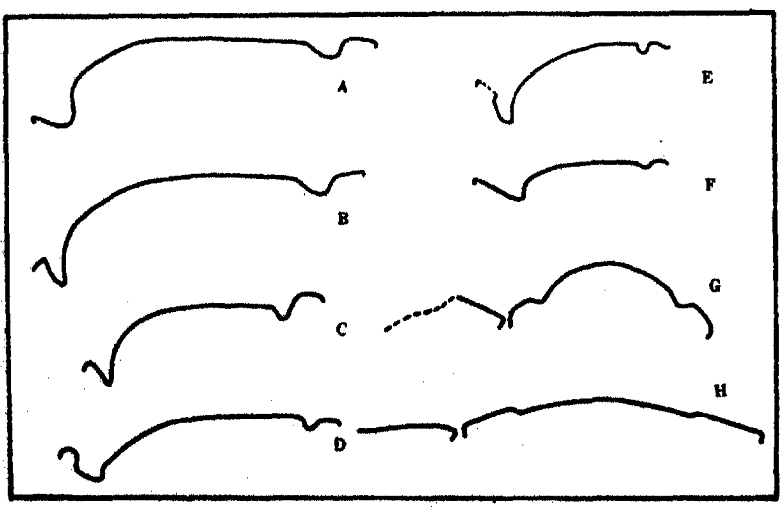


Fig. 1.—Longitudinal median profiles of the cephala of *A Calymene bowiei* sp. nov., *B C. killarensis* sp. nov., *C Gravicalymene angustior* (Chapman), *D G. hetero* sp. nov., *E. G. kilmorensis* sp. nov., *F. Flexicalymene* sp.; transverse profiles through the second glabellar lobes of the cephala of *G. Calymene bowiei* sp. nov., *H. C. killarensis* sp. nov., showing contrast in tumidity.

the general outline suggested by the cranidium is that of one tending towards a triangular shape. *C. bowiei* is named after Mr. Bowie, manager of the Killara estate, who directed the writer to the fossil locality from which the holotype was obtained. Specimens of *Beyrichia* and *Stropheodonta bipartita* (Chapman) occur on the same piece of rock as the type.

Calymene killarensis, sp. nov.

(Plate VII., figs. 8, 3, 4.)

Type material.—The internal cast of a cranidium (holotype) in the National Museum, Melbourne (reg. No. 14506), collected from the bluish-grey shale of Syme's Tunnel, Killara (locality 34).

Age.—Yeringian Series—Lower Devonian.

Description.—Cephalon moderately convex; of the profile shown in fig. 1B. Glabella broad (compare the genotype), overhanging the axial furrows; projects well forward past the fixed cheeks. Four lobes on each side, reducing sharply in size posterior-anteriorly. First lobes almost quadrangular, and connected with the main body of the glabella by bridges which are almost as elevated as the lobes themselves. The main body of the glabella, the bridges, and the lobes form a more or less continuous arch, and contrast in this respect with *C. bowiei* (figs. 1G, H). Second lobes elongated, and flattened on the ends, which are in juxtaposition with buttresses on the fixed cheeks; these second lobes are very noticeably directed forwards, making an angle of about 30° with a line joining the posterior margins of the eyes. Third lobes small, with strong furrowing behind, but shallow furrow in front. Fourth lobes consist of small bulges on sides of glabella, but there are definite furrows in front of and behind these lobes. There are small, rather sharp intermediate lobes between the first and second lobes. Large "antennary" pits lie in the axial furrows beside the fourth lobes. The preglabellar field is short, shallow, and recurved. The recurved part is thin, and projects outwards and upwards at an angle of over 45° with the horizontal (fig. 1B). Eyes opposite second lobes. Axial furrows moderately wide in front of the buttresses, and narrow behind them. Sutures begin just above genal angles and curve in towards the eyes, become almost parallel with the posterior margin of the cephalon when nearly to the eyes; from the eyes the sutures run straight forward to the anterior margin of the cephalon. Posterior intramarginal furrows broad; posterior walls a little steeper than the anterior walls. Occipital ring narrows at the extremities, which turn in towards the corners of the fixed cheeks. Genal angles rounded. Small pieces of the external mould obtained when clearing the fossil of matrix showed the cephalon to have been ornamented with a fine granulation.

Measurements of holotype.—Length of cranidium, 20 mm.; width of genal angle to centre of glabella, 25 mm.

Comment.—The examination of a number of specimens suggests that the axial furrows narrow slightly with age. The thorax is not known. Occasional pleurae are found but no complete thorax has yet been discovered, although the species is quite common at Killara, after which place the fossil is named. Pygidia are common, and probably belong to the same species. They are broad and very convex, with deep axial furrows. There are seven axial rings, and five pleural ribs, the last of which is parallel to the axis. The first four are bent backwards and are grooved distally for about half their length. The pygidium is closely and finely granulate. The cast and mould from which this description of the pygdium has been made, have been lodged in the National Museum (reg. Nos. 14511 and 14512).

The new species is comparable with *C. blumenbachi* which it resembles in its large sub-rectangular glabella. The chief differences are:—(1) The frontal lobe of the glabella does not overhang the pre-glabellar field as in *C. blumenbachi.* (2) The first lobes are even more quadrilateral in the new species than in the compared one. The second lobes, like those of *C. blumenbachi,* "when viewed from above show a papillate outline as if reaching out to the buttress on the fixed cheeks" (Shirley, 1933, p. 60), but much more so, and instead of being directed transversely, they are directed forwards as described. Judging from Shirley's figures (1933, pl. 1), the fourth lobe on our species is much better developed.

Occurrence.—*Calymene killarensis* has been collected by the author from Syme's Tunnel, Killara (loc. 34), and Syme's Homestead, Killara (loc. 33). A crushed specimen from the road cutting near the limestone quarry at Seville (loc. 38) probably belongs to this species. Chapman (1908, p. 269) records *Calymene* sp. from the Seville limestone (loc. 37). A plasticine impression of this mould shows that the specimen has buttresses opposite the second, and therefore belongs to the genus *Calymene sensu lato.* However, the preglabellar field is not preserved. These localities are shown on fig. 2, the numbers following on those previously used (Gill, 1940).

Genus GRAVICALYMENE Shirley, 1936.

Genotype **Gravicalymene convolva** Shirley, 1936.

When Shirley established the sub-genus *Gravicalymene,* the genotype was the only species known, and this came from the Upper Bala of Britain. Since then four other species have been referred to this genus, and another is now added in this paper.

When describing the Baton River (N.Z.) Beds, Shirley (1938) referred *Calymene angustior* Chapman to this genus, and also *C. australis* Etheridge and Mitchell, which he thought was almost certainly synonymous with the former. The present writer referred a new species, *Gravicalymene cootamundrensis* to this genus (1940), and later referred *Calymene malounkaensis* Mansuy to it, and suggested the elevation of Shirley's sub-genus to generic rank (Gill, 1942, p. 45).

Diagnosis of Genus *Gravicalymene*.—Calymenidae without papillate glabellar lobes, or buttresses on the fixed cheeks. Glabellar outline bell-shaped. Pre-glabellar field recurved with roll-like edge. Eyes opposite, or slightly anterior to, second lobes. Cephalic margin entire. Thorax (where known) of thirteen segments.

Range of Genus.—Ordovician to Devonian.

Occurrence in Victoria: Three species of this genus are known from Victoria, viz., *G. angustior* (Chapman), *G. hetera* sp. nov., and *G. kilmorensis,* sp. nov.

Gravicalymene angustior (Chapman).

(Plate VII., figs. 5, 10.)

Calymene angustior Chapman, 1915, pp. 164-166, Pl. XV., figs. 8-10.

Calymene australis Etheridge and Mitchell 1917, pp. 481-486, Pl. XXIV., figs. 1-3, ?4, 6-7.

Calymene (Gravicalymene) ?angustior Shirley, 1938, p. 487, Pl. XLIV., fig. 17.

Gravicalymene angustior Gill, 1942, p. 45.

The following is a re-description of this species from the holotype, and (where indicated) from the paratype presented by Chapman.

Carapace.—Measurements approximately 54 mm. long and 39 mm. wide. The carapace is damaged and so precise measurements are not possible. Widest across genal angles, and tapering to the posterior end of the pygidium.

Cephalon.—Sub-semi-circular and about a third length of carapace.

Narrow, bell-shaped glabella projecting a little beyond the fixed cheeks, with three distinct and a fourth incipient lobes on each side, reducing sharply in size posterior-anteriorly. Glabella tumid, elevated above fixed cheeks, and of the profile as drawn in fig. 1c. Pre-glabellar field (seen only in paratype) with roll-like thickened edge, which is somewhat more thickened opposite the axial furrows. Eyes slightly anterior to the middle of the second lobes.

As the anterior margin of the holotype has been destroyed, the following measurements to give the proportions of the cephalon are taken from the paratype. However, the genal angles of the paratype are obscured by matrix, and right free cheek is displaced. There has been a slight oblique crushing of the cephalon.

Length of paratype cephalon, 14·5 mm.

Width of paratype cephalon, 30 mm.

Length of glabella, 10 mm.

Width of glabella across third lobes, 7 mm.

Width of glabella across first (posterior) lobes, 10 mm.

A hypotype (Pl. VII., fig. 5), consisting of a cephalon (National Museum, reg. No. 14507), is now added, providing the following features:—Eyes situated about a quarter of the distance from the axial furrows to the margin of the free cheeks. Genal angles widely rounded. Free cheek suture commences in middle of the genal "angle", and proceeds to a point level with the posterior margin of the eye and half way between the margin of the free cheek and the eye, then proceeds to the posterior margin of the eye. From the anterior margin of the eye the suture proceeds to the anterior border of the cephalon with a slight outward curve. Cephalon finely granulated with granules of different sizes (this is also seen in the paratype). The hypotype is from Ruddock's Quarry (location 20).

Thorax (described from holotype).—Consists of thirteen segments. Axis approximately semi-circular in cross-section, and elevated well above the pleural areas. The axial rings have a prominent knob on each side of the axis. The axis with these knobs occupies a third of the width of the thorax. Pleurae fairly flat until at about three-quarters of their length from the axis, where they are bent sharply downwards. Each pleuron is deeply grooved. The free ends of the pleurae are rounded and curled forwards a little.

Pygidium (described from holotype).—As in the thorax the axial area is elevated well above the pleural areas. The axis tapers back evenly and carries six axial rings. The pleural ribs are streamlined backwards and are grooved distally for a little more than half their length. Well-marked furrows occur where the pleural areas join the axis.

Comment.—*Gravicalymene angustior* is very much like, and therefore presumably closely related to *G. cootamundrensis*, with which it differs in the following points:—

1. The cephalon is semi-circular with widely rounded genal angles in Chapman's species, whereas the compared species has a sub-quadrilateral cephalon with much less rounded genal angles. The cephalon is very convex in the former, and flat in the latter.

2. The free cheeks are wide, and the eyes near the glabella in Chapman's species, whereas in the compared species the free cheeks are narrow, and the eyes nearer the outer margin of the cephalon.

3. The carapace is much smaller and narrower in *G. cootamundrensis* than in *G. angustior*.

Chapman's species has obvious affinities with *G. interjecta* (Corda) of Étages F and G in Bohemia (Barrande, 1852, p. 570). *G. augustior* has a different pre-glabellar field and general profile; the trifurcate furrow between the first and second lobes described in *G. interjecta* is not present. It is interesting to note this link with the Bohemian facies in Europe. *G. angustior* also appears to be comparable with *G. malounkaensis* (Mansuy) from Indo-China (Mansuy, 1916, Pl. IV., figs. 4*a-c*). Shirley (1938) included *Calymene australis* (Etheridge and Mitchell) in the synonymy of *G. angustior* and commented (p. 487), "From an examination of the figures and description of *C. australis* (Etheridge and Mitchell), the New Zealand material appears to be identical: the authors specially mention the thickened margin of the pre-glabellar field and the lack of buttresses on the fixed cheeks. They also express a doubt whether their species is really separable from *C. angustior* of Chapman." The new data for *G. angustior* given in this paper (the nature of the genal angles and facial sutures) may be paralleled by Etheridge and Mitchell's fig. 2, Plate XXIV. In the synonymy given above, figure 4 on Etheridge and Mitchell's Plate XXIV. is questioned because it appears to have a sub-quadrilateral cephalon reminiscent of *G. cootamundrensis*. It is hoped to clarify the relationships of these species after the war when the types become available again.

Chapman (1915, p. 166) records this species from reddish sandstone in the "Range on E. side of commonage, Kilmore". This specimen is in the National Museum (the number 1208 is printed on it in red paint), and is described hereunder as *Flexicalymene* sp.

Etheridge (1899) records "*Calymene*" from Cooper's Creek, Gippsland. This fossil (Geol. Survey No. 178) has suffered compression, but no doubt belongs to *G. angustior*. No. 174 was determined by Etheridge as "*Calymene* sp.", but was retained for further study according to the note in the G.S.V. register. It is

therefore presumably still in the Australian Museum, Sydney. The G.S.V. register states that No. 178 now figured (Plate VII., fig. 10), is the same as No. 174.

Occurrence.—*Gravicalymene angustior* is known in Victoria from the following localities:—Cooper's Creek, Walhalla; Ruddock's Quarry (loc. 20); Ruddock's Corner (loc. 21); and North of Ruddock's (loc. 39). Figure 2 shows the exact situation of the three last-named localities. The species has also been recorded from the Australian Capital Territory (Woolnough, 1939), but the specimen has not been examined by the writer.

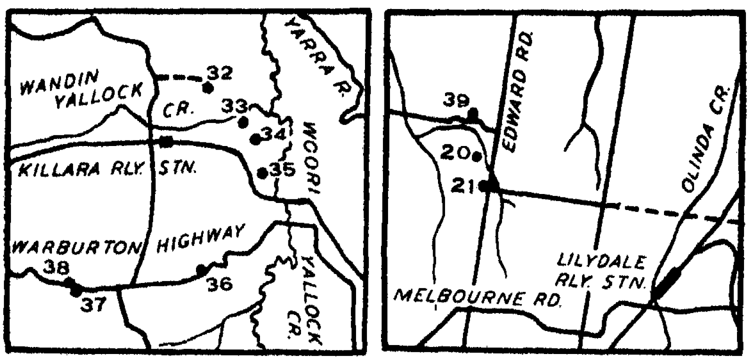


FIG 2.—Fossil localities of the Killara District and north-west of Lilydale.

Gravicalymene hetera, sp. nov.

(Plate VII., fig. 12.)

In the National Museum, Melbourne, (reg. No. 14508), there is a cranidium in bluish-grey, indurated, fine-grained sandstone from Kilmore East, presented by L. C. Parker, Esq., on 12th July, 1924. This fossil has been selected as the holotype for *G. hetera*, to which also should be referred the fossil figured by Chapman (1915, Pl. XV., fig. 10) from locality "Bb20, Kilmore Creek, north of the special survey." The holotype has been distorted a little by lateral pressure.

Description.—The fossil is near *G. angustior*, but differs in the following respects:—

(1) The pre-glabellar field is conspicuously wider and deeper than in *G. angustior*; the rolled "lip" is thinner and sharper than in the compared species.

(2) The glabella does not extend forward as far as it does in *G. angustior*, nor is it elevated high above the fixed cheeks as in that species. The profile is given in fig. 1D. The new species has

fourth incipient lobes as in *G. angustior,* but the "antennary pits" appear to be placed further forward. The measurements of the holotype are:

Length of cephalon, 14 mm.

Width from genal angle to centre of glabella, 20 mm.

Comment.—The Australian species of *Gravicalymene* form a compact group suggesting local evolution of the species. The occurrence of *G. angustior* in the Lower Devonian of New Zealand (Shirley, 1938) suggests some shallow sea connexion with that area as these trilobites show by their structure, the lithology in which they occur, and the fauna with which they were associated, to be of littoral habitat. The occurrence of *Gravicalymene* in Indo-China is interesting as suggesting connexion with that area.

Gravicalymene kilmorensis, sp. nov.

(Plate VII., fig. 9.)

Type Material.—The internal cast of a cranidium (holotype) in the National Museum, Melbourne, reg. No. 14509, from Kilmore East, presented by G. L. Pentreath, esq., 12th July, 1924. The matrix is a bluish-grey, fine-grained, indurated sandstone.

Description.—Cephalon shorter in proportion of width to length than *G. angustior.* Glabella bell-shaped and squat, with three distinct lobes and incipient fourth lobe on each side reducing sharply in size posterior-anteriorly; does not overhang pre-glabellar field; front of glabellar approximately level with forward extensions of fixed cheeks. Axial furrows very open and wider anteriorly than posteriorly. Pre-glabellar field recurved with small subsidiary ridge on roll-like edge. Profile as in fig. 1E. Edge of pre-glabellar field not thickened opposite axial furrows as in *G. angustior.* Eyes opposite second lobes, and much nearer axial furrows than margin of cephalon. Free cheek sutures pass more directly to the posterior margin of the eye than they do in *G. angustior.* Thorax and pygidium unknown.

Comment.—*G. kilmorensis* differs notably from *G. angustior* in (1) the squat proportions of the glabellar; (2) the wide axial furrows; (3) the presence of a subsidiary ridge on the pre-glabellar field, and its lack of thickening opposite the axial furrows; (4) the straighter course of the post-ocular part of the free cheek sutures.

The fossil is decorticated, leaving no indication of the nature of the surface ornament (if any). It is named after the town in the vicinity of which it was collected.

The generic position of this fossil presents an interesting problem. *Gravicalymene* has no subsidiary ridging on the pre-glabellar field according to the original diagnosis of the genus. The pre-glabellar field of the holotype of *G. kilmorensis* was slightly damaged immediately in front of the glabella when the specimen was being cleared of its matrix. However, the nature of the profile, as shown in fig. 1E, is still clear to one side of this point. Shirley's *Gravicalymene* and *Flexicalymene* closely approximate to one another. The description "Thorax 13 segments; glabella outline bell-shaped; pre-glabellar field recurved; axial furrows slightly contracted at each glabellar furrow" would apply equally to the above two genera according to Shirley's diagnoses. The only distinguishing feature in such an instance would be "recurved without subsidiary ridging" as against "recurved with roll-like edge". The fossil now described as *G. kilmorensis* has a recurved pre-glabellar field, but with a flattened slope as shown in the profile. *Diacalymene* (*vide D. drummockensis* in Shirley, 1936, p. 391) is characterized by the development of a subsidiary ridge in the pre-glabellar field, but the new species cannot be referred to *Diacalymene* as that genus possesses papillate second lobes. Shirley states (1936, p. 392) that such features as the character of the pre-glabellar field "must be used with caution and only in combination with other characters of the skeleton". Because of its strong affinities with species of *Gravicalymene*, our new species is doubtless best accommodated in that genus.

Gravicalymene spp.

(1) *Gravicalymene* cf. *kilmorensis*, sp. nov. A specimen in the National Museum (reg. No. 14510) from the Moonee Ponds Creek (Melbournian), collected by Mr. Spry, 5/10/22, belongs to the genus *Gravicalymene* (Pl. VII., fig 7). It is not sufficiently well preserved to make determination certain, but it is probably *G. kilmorensis*, sp. nov.

(2) From Locality 9, allotment 10, Parish of Redcastle, Dr. D. E. Thomas collected specimens of *Gravicalymene* (Geol. Surv. reg. Nos. 38006, 38007, 37974, 37989) which belong, apparently, to yet another species. The great thickness of the rolled edge on the pre-glabellar field is a notable character. The material is not considered good enough on which to erect a new species.

(3) Two specimens of a species of *Gravicalymene*, very much like *G. angustior*, have been collected by the writer from Syme's Tunnel, Killara (loc. 34). However, the glabella stretches further forward than in the species named, the edge of the pre-glabellar field is thinner and sharper, and in size they are very

much smaller. *Calymene* (*sensu lato*) is common at this locality, but the above are the only two specimens of *Gravicalymene* yet found in the district.

Flexicalymene sp.

(Plate VII., fig. 11.)

Chapman (1915) referred a trilobite from reddish sandstone from " range on east side of Reserve of Commonage, Kilmore " to *G. angustior.* This fossil was collected by the Geological Survey in 1903, and is now housed in the National Museum (reg. No. 1208). The specimen is an exfoliated cranidium with a short glabella much narrower in front than behind. The glabella is produced forward of the fixed cheeks. The very wide and high pre-glabellar field is the most conspicuous character of this fossil. The cephalon is 11 mm. long, and the pre-glabellar field occupies 3 mm. (more than a quarter) of the length. The pre-glabellar field is directed forwards and upwards at an angle of 25°–30° to the horizontal. The profile is as shown in figure 1F. The anterior edge of the pre-glabellar field is rounded, but without the " draught-stopper " edge so characteristic of *Gravicalymene.* Like *Gravicalymene* and *Flexicalymene* this fossil has no buttresses opposite the glabellar lobes, and the fixed cheek margins draw in slightly opposite the inter-lobal furrows.

The main features of this form are distinct, and indicate it to be a new species, but the present specimen is scarcely good enough to be made into a holotype. This is the first record of this genus from Australia. Shirley described *Flexicalymene* as a sub-genus, and elsewhere it has been raised to generic status. This lead is followed here, but it is noted that *Flexicalymene* and *Gravicalymene* closely approximate to one another, and that the differences between these genera are not as great as the differences between others of the sub-genera proposed by Shirley.

Stratigraphical Considerations.

The genera *Gravicalymene* and *Flexicalymene,* which are closely related, were described originally by Shirley from the Ordovician of Great Britain (Llandeilo and Bala Beds). Both genera are now known from the Silurian. The former genus is also known from the Lower Devonian, and the latter from beds which are either high in the Silurian or low in the Devonian sequence. The range in time of these genera has therefore been considerably extended.

Another point of interest is the geographical distribution of some of these species. *Gravicalymene angustior* has been recorded from both Australia and New Zealand. A related species has been recorded from Cootamundra, New South Wales (Gill, 1940*a*), and a similar species occurs in the Lower Devonian of Indo-China (Mansuy, 1916). The fauna described by Mansuy has other similarities with our Victorian one. *Styliolina* occurs there as it does in Victoria (Gill, 1941), and a shell figured on his Pl. V., fig. 10), is very like our *Chonetes robusta* Chapman. Mansuy, in 1919, described further fossils from that part of the world. His *Chonetes ningpoensis* is reminiscent of our *Chonetes cresswelli* Chapman. The spiriferid of Mansuy's Pl. 5, fig. 6, is very like an undescribed species from Lilydale.

From wide areas of the world and from different stratigraphical horizons, writers have claimed to have found *Calymene blumenbachi* Brongniart. Shirley (1933, p. 62) considers that most of these determinations should be looked upon with suspicion. It appears that in this group a high mutation rate obtained, and numerous closely related forms resulted. Shirley (1936) has described some of the forms closely related to *C. blumenbachi*, and in the present paper it has been shown that *Calymene killarensis*, sp. nov., belongs to this gens. The separation of this series of related forms into distinct species will greatly assist stratigraphical as well as palaeontological studies. A similar review is needed with such brachiopods as *Atrypa reticularis* and *Leptaena rhomboidalis*.

Fossil Localities.

The location of the fossil localities is shown in fig. 2. The numbers are continued from those given previously (Gill, 1940*b* and 1942).

32. "Killara Quarry" is a disused quarry in quartzitic sandstones (with a few interbedded shales) at the end of a disused road. *Anoplia australis* has been collected from there, and as this brachiopod is known only from beds of Yeringian age, the Killara Quarry beds are regarded as Yeringian.

33. "Syme's Homestead".—The first reference to this locality is in Gill, 1939. The fossils were obtained from an old water race near the Wandin Yallock Creek in front of the homestead of the Killara estate. The matrix is a fawn mudstone which has yielded a very rich Yeringian fauna.

34. " Syme's Tunnel ".—This locality is a tunnel which was mined for the purpose of storing apples in the days before cold storage. The rocks are bluish-grey shales which are weathered often to a brownish colour near the surface. As far as can be ascertained, this locality is that which the early Geological Survey records refer to as " Junction of Woori Yallock and Yarra ".

35. " Syme's Quarry " is just below the manager's house on the Killara estate, and was opened up in 1936 to provide stone for private roads on the estate. It consists of the same kind of rock as seen at locality 34 and is on approximately the same strike.

36. " Warburton Highway, Killara " was mentioned in Gill, 1941, p. 152. The locality is a road cutting where whitish mudstones, sometimes coloured red with iron oxide, outcrop. *Styliolina* is abundant.

37. " Seville Limestone " is a disused quarry on the south side of the Warburton highway on the east side of Seville. Except where the rock is weathered the fossils are very difficult to extract, as the " limestone " contains about 60 per cent. silica. Chapman (1908) has recorded fossils from this locality.

38. " Seville cutting " is a long cutting on the Warburton highway immediately west of locality 37. Shales and sandstones outcrop with occasional fossiliferous bands. West of this point to where the bedrock disappears under the igneous rocks of Mt. Dandenong, the outcrops appear to be unfossiliferous.

39. " North of Ruddock's " is a low road cutting north of locality 20. The matrix and fauna are the same as at localities 20 and 21.

Bb20 is a Geological Survey locality so marked on Quarter Sheet 4 SW, where a note refers to the presence of "*Calymene*". Harris and Thomas (1937, p. 77) refer to the presence at Bb20 of *Monograpti* comparable with forms found in the Melbournian beds.

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Description of Plate.

PLATE VII.

FIGS 1, 2, 6.—*Calymene bowiei* sp. nov. 1 and 2 internal cast and external mould respectively, × 1½ approx. Fig. 6 is part of the glabella in fig. 1 enlarged to show nature of ornament as seen on internal cast.

FIGS. 3, 4, 8.—*Calymene killarensis* sp. nov. Figs. 3 and 4 are the internal cast and external mould respectively of a pygidium believed to belong to this species. *Fig.* 8 is the holotype cranidium × 2.

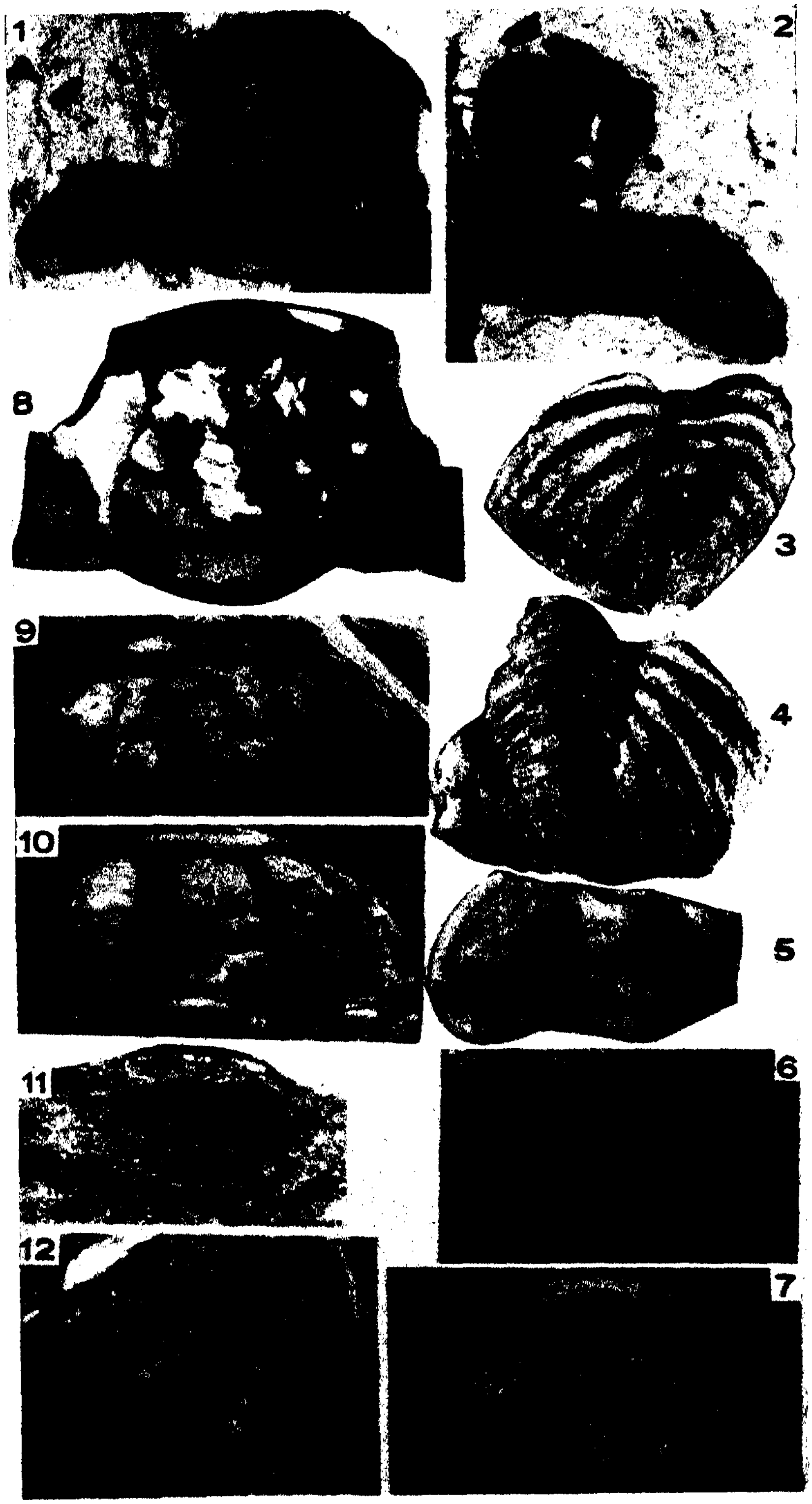
FIGS. 5, 10.—*Gravicalymene angustior* (Chapman). Fig. 5 is the hypotype showing position of the eye and the nature of the suture between the free and fixed cheeks. Fig. 10 is a compressed cephalon referable to this species from Cooper's Cr., Gippsland.

FIG. 12.—*Gravicalymene lictera* sp. nov. Holotype, × 2.

FIG. 9.—*Gravicalymene kilmorensis* sp. nov. Holotype, × 2.

FIG. 7.—*Gravicalymene* cf. *kilmorensis* sp. nov. Specimen from Moonee Ponds Creek × 2.

FIG. 11.—*Flexicalymene* sp. × 2.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[PROC. ROY. SOC. VICTORIA, 56 (N.S.), PT. II., 1945.]

ART. XII.—*Recent Foraminifera from Barwon Heads, Victoria.*

By W. J. PARR, F.R.M.S.

[Read 9th December, 1943; issued separately 30th June, 1945.]

Introduction.

Up to the present, only one paper, the well-known one by Mr. Frederick Chapman in the Journal of the Quekett Microscopical Club for 1907, has been published giving a general account of the foraminifera found on the coast of Victoria. While Mr. Chapman's work has been supplemented by descriptions given of a number of species by the present writer, either alone or in

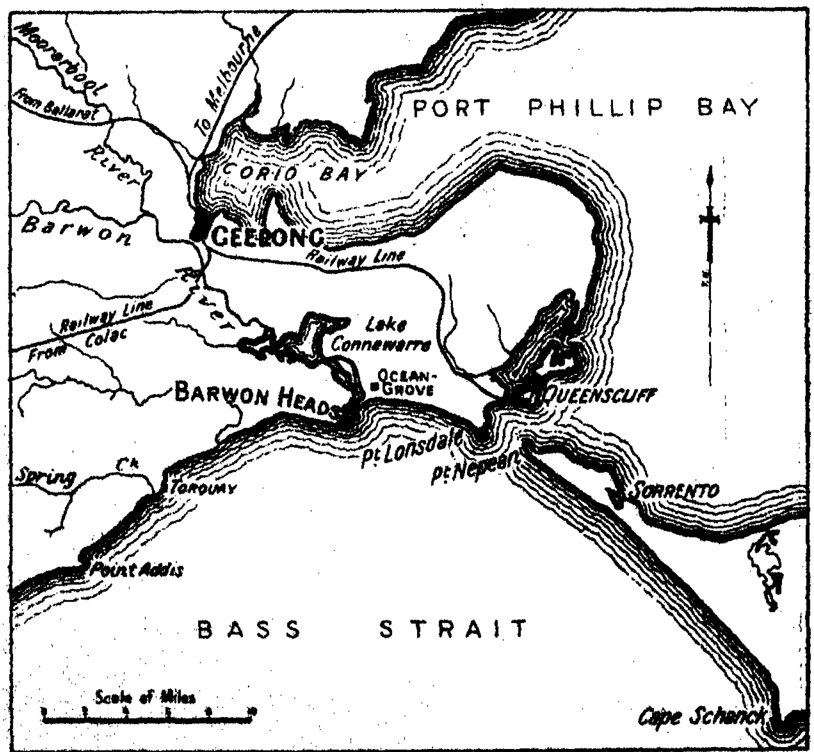


FIG. 1.—Locality Plan of Barwon Heads District.

collaboration with Mr. A. C. Collins, in papers published in this Journal during the years 1930, 1932, and 1937, it has for some time been evident that there are still many new or unrecorded foraminifera occurring in Victorian waters. Practically all of these were found in a number of shore gatherings made at Barwon Heads over a period extending from 1932 until 1943 by Mr. W.

Baragwanath, the Director of the Geological Survey of Victoria, and his daughter, Miss Betty Baragwanath, and kindly made available to me. Apart from the occurrence in the gatherings of practically all of the previously recorded species from Victoria, they provide so much new information on our coastal foraminifera that the following notes have been prepared.

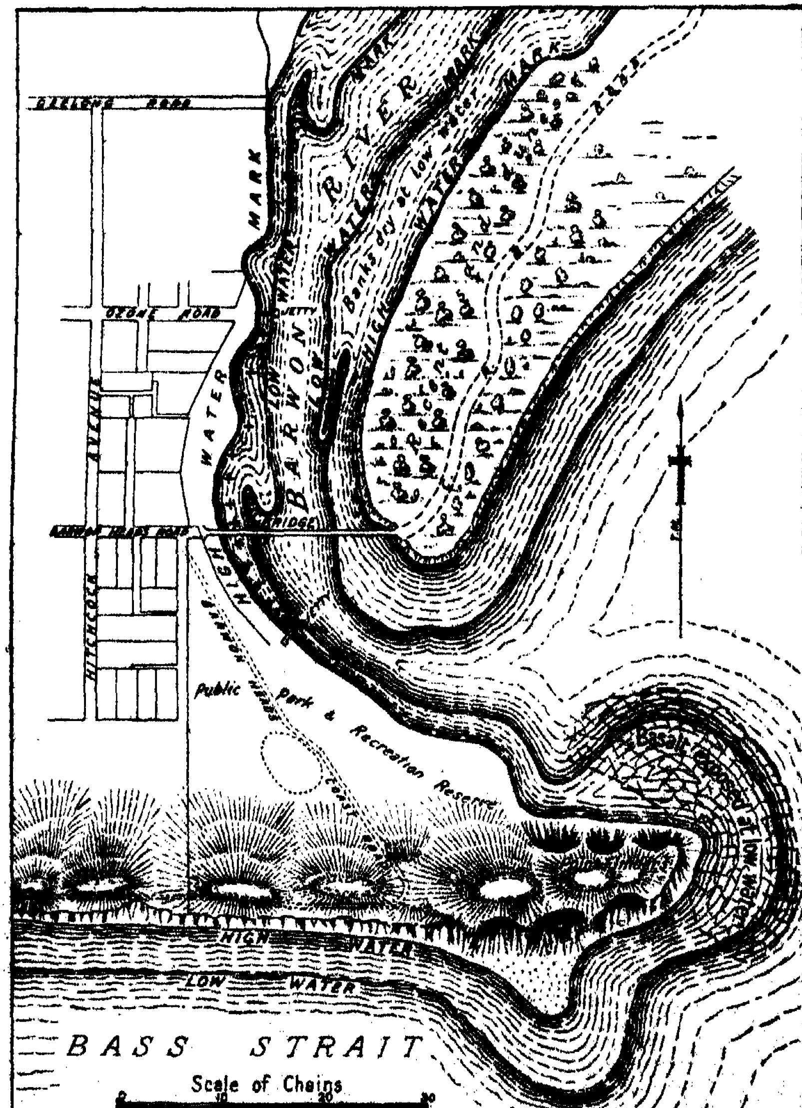


FIG. 2.—Sketch Map of Barwon Heads, showing area from which collections were made indicated thus +.

The township of Barwon Heads is situated on the west side of the mouth of the Barwon River, about six miles west of the entrance to Port Phillip Bay. Between the township and the shores of Bass Strait is the mass of dune limestone, resting on Older Basalt, known as Mt. Colite, which rises conspicuously above the sand dunes which extend for many miles on either side along the coast.

Inland, the Barwon River widens to form Lake Connewarre, on the northern shores and part of the floor of which are deposits of fossiliferous marls of Middle Miocene age. These deposits extend seawards and outcrop on the sea floor at Ocean Grove, a little north-east of the mouth of the Barwon River.

The Barwon River is subject to tidal influence up to a point above the head of Lake Connewarre and the material collected by Mr. Baragwanath has been deposited by the tide on the sandy beach which forms the west bank of the river over a distance of from 20 to 30 chains inland from its mouth.

As might be expected with material collected over so many years and under varying conditions of weather and tide, there is some difference in the number and variety of the foraminifera present in the various gatherings. While the decision to describe the foraminifera was made so late that those from each gathering were not kept separate with a record of the conditions prevailing at the time of collection, it can be stated that, with the following exceptions, the species in each gathering, while varying in abundance, were the usual forms occurring on a sandy bottom in shallow water on the Victorian coast. On one occasion, specimens of *Tretomphalus*, which had clearly drifted in from the open sea, occurred in great numbers, while, on another, numerous examples of a new species of *Webbinella*, an adherent genus, which was not found in any other gathering, were met with. Two or three gatherings were noteworthy for the occurrence of many exceptionally fine specimens of the rare genus *Delosina*, which has since found to be widely distributed in Bass Strait.

A source of difficulty in dealing with the foraminifera has been the presence in the gatherings of fossil species derived from the Tertiary deposits to which reference has been made. These fossil foraminifera are usually so perfectly preserved that their appearance does not differ from that of Recent specimens and they can accordingly only be distinguished by comparison with those occurring in the local Tertiary deposits. After excluding

all fossil and doubtful species, the number of forms recognized as of Recent origin is 142, including 14 which are described as new. To avoid the necessity of giving the synonmy of every species, references to literature are given only when the species has not been previously sufficiently dealt with in publications which are readily available. With these exceptions, the references will be found in one of the following publications:—

BRADY, H. B., 1884.—Report on the foraminifera dredged by H.M.S. "Challenger" during the years 1873-1876.—Rep. Voy. *Challenger*, Zoology, vol. 9.

CHAPMAN, F., 1907.—Recent Foraminifera of Victoria: Some Littoral Gatherings. *Journ. Quekett Micr. Club*, ser. 2, vol. 10, pp. 117-146, pls. 9, 10.

CUSHMAN, J. A., 1918-1931.—The Foraminifera of the Atlantic Ocean. *U.S. Nat. Mus.*, Bull. 104, pts. 1-8.

PARR, W. J., 1932.—Victorian and South Australian Shallow-Water Foraminifera, Part I. *Proc. Roy. Soc. Vic.*, n.s. 44 (1), pp. 1-14, pls. 1, 2; Part II. *Ibid.*, pt. 2, pp. 218-234, pls. 21, 22.

PARR, W. J., and COLLINS, A. C., 1937.—Notes on Australian and New Zealand Foraminifera. No. 3. Some Species of the Family Polymorphinidae. *Proc. Roy. Soc. Vic.*, n.s. 50 (1), pp. 190-211, pls. 12-15.

It may be noted here that I now believe that the species recorded in my 1932 papers as being from "Williamstown. Silty mud. (Collected many years ago by the late J. Gabriel)" were not of Recent origin, but were from fine washings, of Middle Miocene age, from one of the bores put down in the Williamstown district in search of brown coal. The specimens of *Discorbis margaritifer* recorded at the same time from shore sand, Point Lonsdale, are also now regarded as being from the Middle Miocene deposits in the vicinity of Ocean Grove. Examples of this species occur commonly in the Barwon Heads shore gatherings, where there can be no doubt of their fossil origin.

To Mr. and Miss Baragwanath, I desire to express my sincere thanks for collecting and making the material available for examination. The assistance of Mr. Arthur Kennedy, of the Mines Department, who made the drawings illustrating the paper is also gratefully acknowledged. I am also indebted to Dr. M. F. Glaessner for his advice on the identification of several of the species.

The types and other specimens are in the writer's collection, and will later be deposited in the National Museum, Melbourne.

Systematic List of Species.

Family AMMODISCIDAE.

1. AMMODISCUS MESTAYERI Cushman (Pl. VIII., figs. 1, 2).

A. mestayeri Cushman, 1919, Proc. U.S. Nat. Mus., 56, p. 597, pl. 74, figs. 1, 2.

This species is represented by ten small examples. It was described from off the Poor Knights Islands, off the east coast of New Zealand, and is stated by Cushman to be distinguished by its few coils and protuberant proloculus.

Family SACCAMMINIDAE.

2. PROTEONINA SPICULIFERA Parr (Refs., Parr, 1932, p. 218).

Two specimens similar to those previously figured by the writer from Point Lonsdale, Victoria. The form and wall structure of the test of this species suggest that it may be merely the detached chambers of *Reophax distans*, var. *pseudodistans*, which, like the preceding species, was described by Cushman from off the Poor Knights Islands. No specimens showing an opening at both ends or consisting of more than one chamber have, however, been found and, in the absence of these, the reference to *Proteonina* is retained.

3. WEBBINELLA BASSENSIS, sp. nov. (Pl. VIII., figs. 3*a-c*).

Test adherent, plano-convex, circular in outline, usually with a slight rim around the base; chamber single, undivided, consisting of a hemisphere of chitin which supports the weakly-cemented wall of very fine particles of quartz; dorsally the wall is thin, but it thickens towards the base, where in addition to forming the marginal flange it extends underneath for a short distance to cover part of the chitinous floor; no general aperture; colour very pale fawn. Diameter, 0·5 mm.

There are over 80 specimens, all of which are detached from the object to which they were adherent during life. The present occurrence appears to be unique, as the genus usually occurs in small numbers in comparatively deep water attached to stones and shell fragments. The appearance of the Barwon Heads specimens suggests that they were adherent to marine algae. Usually the chitinous lining is preserved and the protoplasmic body has in many cases collected into a brown, rounded mass on the transparent floor of the test.

W. bassensis does not closely resemble any previously described species of *Webbinella*. For assistance in its identification, I am indebted to Mr. Edward Milton, F.R.M.S., of Torquay, England, who has also kindly forwarded examples of an undescribed English Recent species of *Webbinella* for comparison.

Family LITUOLIDAE.

4. HAPLOPHRAGMOIDES CANARIENSIS (d'Orbigny) (Refs., Cushman, 1920, p. 38).

There are seven examples of the normal form of this species.

Family TEXTULARIIDAE.

5. TEXTULARIA SAGITTULA Defrance (Refs., Brady, 1884, p. 361).

Four typical specimens.

6. TEXTULARIA CONICA d'Orbigny (Refs., Cushman, 1922, p. 22).

A typical example.

7. TEXTULARIA PSEUDOGRAMEN Chapman and Parr.

T. gramen Brady (*non* d'Orbigny), 1884, p. 365, pl. 43, figs. 9, 10. Cushman, 1924, Carnegie Inst. Washington Publ. No. 342, p. 15, pl. i., figs. 7, 8.

T. pseudogramen Chapman and Parr, 1937, Aust. Antarctic Expedn., 1911-14 Sci. Repts., Ser. C., vol. I., pt. 2, p. 153.

Several examples. This species is common in Bass Strait. As a holotype was not designated when it was described, I now select the original of fig. 9 of Plate 43 of the "Challenger" Report as the type specimen. This was from "Challenger" Stn. 162, off East Moncoeur Island, Bass Strait, 38-40 fms.

Family TROCHAMMINIDAE.

8. TROCHAMMINA INFLATA (Montagu) (Pl. VIII., figs. 4*a*, *b*). (Refs., Brady, 1884, p. 338.)

Many typical specimens. *T. inflata* is one of the group of foraminifera which will tolerate brackish water, and on the Victorian coast it appears to be most at home under these conditions, as it is common at the mouth of Kororoit Creek, near Williamstown, and at the mouth of the Barwon River, but is rare elsewhere.

Family VALVULINIDAE.

9. CLAVULINA MULTICAMERATA Chapman (Refs., Parr, 1932, p. 4).

One specimen. This species is usually more common in Victorian shore sands.

10. Eggerella sp. (Pl. VIII., fig. 5).

The only specimen found is probably a new species, but more material is required to determine this. The characters of the specimen, which has a length of 0·35 mm., are shown by the figure. The test, except for the final chamber which is white, is warm brown in colour.

Family VERNEUILINIDAE.

11. Gaudryina (Pseudogaudryina) hastata Parr.

G. hastata Parr, 1932, p. 219, pl. 22, figs. 40 *a*, *b*,

G. (*P.*) *hastata*: Cushman, 1937, Cushman Lab. Spl. Publ. No. 7, p. 95, pl. 14, figs. 7, 8.

Several worn examples.

Family OPHTHALMIDIIDAE.

12. Planispirina (?) bucculenta (Brady) (Pl. XII., figs. 1*a*, *b*).

Miliolina bucculenta Brady, 1884, p. 170, pl. 114, figs. 3 *a*, *b*.

Planispirina bucculenta: Schlumberger, 1892, Mém. Soc. Zool. France, 5, p. 208, text-figs. 2-4, pl. 8, figs. 6, 7.

There are several examples which, in external characters, are close to Schlumberger's figs. 6 and 7, as well as a number of smaller, irregular, biloculine specimens. This species, which was described from deep water in the North Atlantic, has, at different times, been referred to "*Miliolina,*" *Planispirina*, and *Triloculina*, but Schlumberger's figures of sectioned specimens show that the internal structure is not the same as that of any of these genera. Wiesner (1931, Deutsche Südpolar Expedn. 1901-1903. XX. Zool., p. 107, pl. 15, fig. 178) has figured what appears to be this species under the name of *Miliolinella subrotunda* (Montagu), var. *trigonina* Wiesner. The genotype of *Miliolinella*, a genus described by Wiesner in the same work, is *Vermiculum subrotundum* Montagu, the internal structure of which is not fully known, but the megalospheric form, as figured by Sidebottom (1904, Mem. Proc. Manchester Lit. Phil. Soc., vol. 48, No. 5, p. 8, text-fig. 2) from the Eastern Mediterranean, shows a resemblance to the stages following the central disc of the microspheric form of *P.? bucculenta* as figured by Schlumberger. Until the growth stages of the microspheric form of *M. subrotunda* are known, the position of *Miliolinella* is uncertain and I have accordingly referred Brady's species doubtfully to *Planispirina* to which the information available suggests that it is most closely related.

13. Nubecularia lucifuga Defrance (Refs., Brady, 1884, p. 134).

Several small examples.

Family MILIOLIDAE.

14. QUINQUELOCULINA DILATATA d'Orbigny (Refs., Cushman, 1929, p. 26).

There are several examples of this West Indian species.

15. QUINQUELOCULINA LAMARCKIANA d'Orbigny (Refs., Cushman, 1929, p. 26).

In his notes on this West Indian species, Cushman states that, in the West Indies, there are two forms which may possibly be distinct. Both have a smooth surface, but in one the peripheral angle is acute and the surface smooth and polished, while in the other the peripheral angle is usually more blunt and the surface dull. The Barwon Heads specimens are similar to the second form. This is common on the Victorian coast.

16. QUINQUELOCULINA SUBPOLYGONA, sp. nov. (Pl. XII., figs. 2*a-c*).

Test about 1½ times as long as broad; chambers distinct; sutures slightly depressed; each chamber polygonal in cross-section, the periphery concave, usually with a projecting, sometimes undulate, carina at either angle; apertural end extended into a short neck, aperture more or less quadrate, with an everted lip and a single bifid tooth; surface dull.

Length 1·0 mm., breadth, 0·6 mm., thickness, 0·4 mm.

This is the commonest species of the genus on the south coast of Australia. It has been confused with *Q. polygona* d'Orbigny, from the West Indies, but has a shorter, more strongly carinate test than that species and is also less regularly built. Another species which resembles *Q. subpolygona* is *Q. sulcata* d'Orbigny, as figured by Cushman (1932, U.S. Nat. Mus., Bull. 161, p. 28, pl. 7, figs. 5-8) from off Fiji. This is proportionately much longer and the apertural end is extended to form a long neck.

17. QUINQUELOCULINA BARAGWANATHI, sp. nov. (Pl. VIII., figs. 6*a-c*; Pl. XII., fig. 3).

Test a little longer than broad, of rather irregular form; periphery subacute; chambers distinct, only moderately inflated; sutures depressed; surface matte, frequently ornamented by short, obliquely curved costae (1 or 2 to a chamber) extending inward from the peripheral angle and sloping toward the apertural end of the chamber; aperture semi-circular, with an everted lip and a flat, semi-circular tooth which is placed in front of the aperture.

Length 0·6 mm., breadth, 0·4 mm., thickness, 0·25 mm.

This is also a common species on the south coast of Australia, and I have specimens from shallow water, near Noumea, New Caledonia. Chapman's record (1907, p. 124) of "*Miliolina*" *undosa* (Karrer) from Torquay, Victoria, probably refers to the same form, but the Recent records of Karrer's species usually relate to a form with a produced apertural neck and a plate-like, sometimes bifid, tooth in the aperture.

18. QUINQUELOCULINA COSTATA d'Orbigny (Refs., Parr, 1932, p. 8).

Examples are common.

19. SPIROLOCULINA ANTILLARUM d'Orbigny (Refs., Parr, 1932, p. 9).

One specimen. The Southern Australian examples of this species attain a greater development than those from the West Indies.

20. SPIROLOCULINA MILLETTI Wiesner.

S. nitida Brady (*non* d'Orbigny), 1884, p. 149, pl. 9, figs. 9, 10. Millett, 1898, J. R. M. S., p. 265, pl. 5, figs. 9–13.

S. milletti Wiesner, 1912, Archiv f. Protistenkunde, 25, p. 207. Cushman, 1917, U.S. Nat. Mus., Bull. 71, Pt. 6, p. 33, pl. 5, fig. 4. Wiesner, 1923, Die Miliolideen der östlichen Adria, p. 30, pl. 4, figs. 7, 8.

Fine specimens similar to those figured by Brady are frequent. They are more regularly formed than those figured by Millett from the Malay Archipelago.

21. SPIROLOCULINA LIMBATA d'Orbigny (Refs., Cushman, 1929, p. 44).

Many large specimens.

22. SIGMOILINA AUSTRALIS (Parr).

Quinqueloculina australis Parr, 1932, p. 7, pl. 1, figs. 8*a-c*.

This species was described by the writer from 7 miles E. of Cape Pillar, Tasmania, 100fms., and recorded also from shore sand, Point Lonsdale, Victoria, and elsewhere. I am indebted to Mr. Arthur Earland, F.R.M.S., for drawing my attention to the fact that it should be referred to *Sigmoilina*.

23. TRILOCULINA TRIGONULA (Lamarck) (Refs., Cushman, 1929, p. 56).

Examples are common. They are of the large, strongly inflated form which occurs so frequently on the coasts of Victoria and South Australia.

24. TRILOCULINA STRIATOTRIGONULA Parker and Jones.

T. striatotrigonula Parker and Jones, 1865, Phil. Trans. Roy. Soc., 155, p. 438 (*nomen nudum*).

Miliolina insignis Brady, 1884, pl. 4, fig. 10 (*non* fig. 8).
T. insignis Parr, 1932, p. 11, pl. 1, fig. 19.

T. striatotrigonula: Parr, 1941, Mining and Geol. Journ., 2 (5), p. 305.

Small specimens. The reasons for the use of this name instead of *T. insignis* (Brady) are given in the last reference quoted.

25. TRILOCULINA TERQUEMIANA (Brady) (Ref., Brady, 1884, p. 166).

There is one example of this striate form of *T. tricarinata*.

26. TRILOCULINA OBLONGA (Montagu) (Refs., Parr, 1932, p. 10).

Examples are rather common. In addition to the narrow form figured by Williamson, there are some broader specimens and two of the biloculine type I have figured from Point Lonsdale, Victoria.

27. TRILOCULINA CIRCULARIS Bornemann, (Refs., Cushman, 1929, p. 58).

Typical specimens are very common.

28. TRILOCULINA CIRCULARIS Bornemann, var. *sublineata* (Brady).

(Refs., Brady, 1884, p. 169.)

Brady described this form from off the Admiralty Islands, on the north coast of New Guinea, 15-25 fms. As figured by him, it has no apertural tooth or plate, but the Victorian specimens have a fairly large, flat, semi-circular tooth in front of the aperture. There are also more compressed and the chambers are not so inflated. Possibly they represent a new species.

29. TRILOCULINA LABIOSA d'Orbigny (Refs., Parr, 1932, p. 220).
Common.

30. TRILOCULINA LABIOSA d'Orbigny, var. *schauinslandi* (Rhumbler).

(Refs., Parr, 1932, p. 220.)

Examples are very common.

31. TRILOCULINA BASSENSIS, sp. nov. (Pl. VIII., figs 7 *a-c*).

Test longer than broad, triloculine, typically with a truncate periphery which in the final chamber is frequently keeled on each edge; chambers distinct; sutures slightly depressed; surface covered with very short, delicate ridges which give a matte effect; aperture subquadrate, longer than wide, with an everted lip and an elongate tooth which is thicker at the inner end.

Length, 0·75 mm., breadth, 0·6 mm., thickness, 0·37 mm.

In many respects, this species resembles *Quinqueloculina subpolygona*, but is triloculine and smaller than the latter. It may also be compared with *Triloculina irregularis* (d'Orbigny), as figured by Cushman (1932, U.S. Nat. Mus., Bull. 161, Pt. 1, p. 54, pl. 12, figs. 2 *a-c*) from off Fiji, 40-50 fms. In this species, the test in transverse section is almost rectangular, but in *T. bassensis* it is roughly triangular, because, unlike the Fijian species, the outer truncate margin of the penultimate chamber is in a plane oblique to that of the final chamber.

32. Pyrgo denticulata (Brady) (Refs., Cushman, 1929, p. 69).

Several specimens.

33. Nevillina coronata (Millett) (Pl. VIII., figs. 8 *a, b*).

Biloculina coronata Millett, 1898, J.R.M.S., p. 263, pl. 6, figs. 6*a-c*.

Nevillina coronata: Sidebottom, 1905. Mem. Proc. Manchester Lit Phil. Soc., 49 (11), pp. 1-4, pl.

There are eight examples of what appears to be the biloculine or *Pyrgo* stage of this species. They attain a length of 0·9 mm. and closely resemble Millett's figures and Sidebottom's figures 5 and 6. I have similar specimens from off Masthead Island, in the Capricorn Group, off the coast of Queensland, 20 fms. The adult stage, in which the test is unilocular, has not been met with and has apparently been recorded only by Sidebottom, whose specimens were from off the Andaman Islands, 16 fms., and Sulu roadstead, 12 fms.

Family SORITIDAE.

34. Peneroplis planatus (Fichtel and Moll).

P. planatus: Cushman, 1933, U.S. Nat. Mus., Bull. 161, Pt. 2, p. 61, pl. 19, figs. 1-3 (gives refs.).

P. pertusus Parr (*non Nautilus pertusus* Forskal), 1943, Malac. Soc. Sth. Aust. Publ. No. 3, p. 22.

Three worn examples. This was previously incorrectly recorded from Barwon Heads by the writer as *P. pertusus*.

Family SPIRILLINIDAE.

35. Spirillina vivipara Ehrenberg (Refs., Cushman, 1931, p. 3).

Two specimens.

36. Spirillina inaequalis Brady (Refs., Brady, 1884, p. 631).

There are many examples of this well-known Indo-Pacific form.

37. Spirillina denticulogranulata Chapman (Refs., Chapman, 1907, p. 133).

This species was described from shore sand, Torquay, Victoria, and is here represented by seven examples. It is probably the same as Brady's *S. limbata*, var. *denticulata*, from off East Moncoeur Island, Bass Strait, 38 fms. Brady has figured only one side of his specimen and, in the writer's opinion, based on the examination of many specimens of *Spirillina* from Bass Strait, the figure represents the dorsal aspect of an asymmetrical form identical with Chapman's species.

38. Spirillina denticulogranulata Chapman, var. *pulchra*, var. nov. (Pl. VIII., figs. 9 *a-c*; Pl. IX., figs. 1 *a-c*).

Variety differing from the typical form of the species in the more numerous whorls and greater number of more delicate tooth-like processes on the dorsal side. Diameter, 0·45 mm.

This form is represented by several specimens. A typical example and what is probably a weakly developed specimen of the same variety are figured. It is intermediate between *S. denticulogranulata* and an undescribed species occurring in the Middle Miocene at Muddy Creek, Victoria, in which the tooth-like processes are absent.

39. Spirillina runiana Heron-Allen and Earland (Pl. IX., figs. 2 *a, b*, 3).

Spirillina vivipara Ehrenberg, var. *runiana* Heron-Allen and Earland, 1930, J.R.M.S., p. 179, pl. 4, figs. 51-53.

Four specimens. This form, which appears to be specifically distinct from *S. vivipara*, was described from off Plymouth, England, from a depth of about 30 fms.

Family NODOSARIIDAE.

40. Lenticulina sp.

Several weak specimens of the *L. gibba* group.

41. Vaginulina vertebralis Parr (Refs., Parr, 1932, p. 221).

Three specimens similar to that described by the writer from shore sand, Torquay, Victoria.

42. Vaginulina bassensis, sp. nov. (Pl. XII., figs. 4 *a, b*).

Test elongate, tapering, somewhat lobulate on the ventral side, compressed in the early stages, later becoming almost circular in transverse section; chambers distinct, increasing in height comparatively quickly, sometimes showing traces of coiling in the

early stages but usually added obliquely at an angle of about 45 deg., or more, with the amount of inflation increasing gradually; sutures distinct, later ones depressed; wall smooth, translucent; aperture eccentric, on the dorsal side, radiate. Length up to 1·5 mm.

There are numerous specimens. This is a puzzling species in several respects. It is not sufficiently compressed to be a typical *Vaginulina* but is nearer this genus than any other. The smaller, less developed specimens resemble some of the open-coiled species of the "*Cristellaria*" *crepidula* group, while a few of the larger examples would be referred to *Dentalina inornata* if found alone. The large series of specimens shows, however, that only one species is present.

43. DENTALINA INORNATA d'Orbigny.

D. inornata d'Orbigny, 1846, For. Foss. Vienne, p. 44, pl. 1, figs. 50, 51. Chapman and Parr, 1937, Aust. Ant. Exped. 1911-14. Sci. Repts. [C.], I. (2), p. 60.

One specimen. This species is better known as *D. communis* d'Orbigny. The reasons for the disuse of this name are given in the reference by Chapman and Parr, quoted above.

44. DENTALINA MUTSUI Hada (Pl. XII., fig. 5).

D. mutsui Hada, 1931, Sci. Repts Tohuku Imp. Univ., Ser. 4, Biology, 6 (1), p. 97, text-fig. 50.

I have referred to this species, which was described from Mutsu Bay, Japan, 15-25 fms., a form of *Dentalina* which is very common at Barwon Heads. Except that they attain a length of 2 mm. as against 3·65 mm. in the Japanese examples, the specimens agree with Hada's description and figure.

45. DENTALINA GUTTIFERA d'Orbigny.

D. guttifera d'Orbigny, 1846, Foram. Foss. Vienne, p. 49, pl. 2, figs. 11-13.

Nodosaria pyrula Brady (*non* d'Orbigny), 1884, p. 497, pl. 62, figs. 10-12 (and later authors).

One broken specimen.

46. NODOSARIA SCALARIS (Batsch) (Refs., Brady, 1884, p. 510).

Several examples.

47. FRONDICULARIA COMPTA Brady, var. *villosa* Heron-Allen and Earland (Pl. IX., fig. 4).

F. archiaciana Brady (*non* d'Orbigny), 1884, p. 520, pl. 114, fig. 12.

F. compta Brady, var. *villosa* Heron-Allen and Earland, 1924, J.R.M.S., p. 157, pl. 10, figs. 54-55.

Two specimens. This appears to be the only Recent record of this form other than those of Brady and of Heron-Allen and Earland from off Raine Island, 155 fms. The last-named authors also had it from the Miocene of Batesford, Victoria.

48. LAGENA LAEVIS (Montagu).

Vermiculum laeve Montagu, 1803, Testacea Britannica, p. 524.

Lagena vulgaris Williamson, 1858, Recent Foram. Gt. Britain, p. 3, pl. 1, figs. 5, 5a.

The specimens are not typical, resembling fig. 14 of Pl. 56 of the "Challenger" Report.

49. LAGENA PERLUCIDA (Montagu) (Refs., Cushman, 1923, p. 46).

The specimens are finely costate on the basal end.

50. LAGENA STRIATA (d'Orbigny) (Refs., Cushman, 1923, p. 54).

Typical specimens of the original globular type.

51. LAGENA SULCATA (Walker and Jacob) (Refs., Cushman, 1923, p. 57).

Good examples are common.

52. LAGENA ACUTICOSTA Reuss (Refs., Cushman, 1923, p. 5).

The specimens have more costae (18-20) than in the typical form of this species.

53. LAGENA ACUTICOSTA Reuss, var. *ramulosa* Chapman (Refs., Parr, 1932, p. 11).

This Southern Australian form of *L. acuticosta* is common in most Victorian shore gatherings.

54. LAGENA GRACILLIMA (Seguenza) (Refs., Cushman, 1923, p. 23).

The specimens are all spirally twisted, and may be merely a smooth form of *L. distoma-margaritifera*.

55. LAGENA DISTOMA-MARGARITIFERA Parker and Jones (Refs., Parr, 1932, p. 11).

This beautiful species is common.

56. LAGENA DISTOMA-MARGARITIFERA, var. *victoriensis*, nov. (Pl. XII., fig. 6).

Test elongate, usually spirally twisted, fusiform with the aboral end pointed and the apertural end extended into a long neck which terminates in a phialine lip; surface ornamented with from eight to ten strong costae.

Length up to 1·5 mm.

This form is common in Victorian shore sands. Its shape is similar to that of *L. distoma-margaritifera*, with which it is always associated, and it appears to be only a costate modification of that species. The twisted and costate test distinguish it from *L. distoma* Parker and Jones.

57. Fissurina lucida (Williamson) (Refs., Cushman, 1923, p. 33).

One specimen.

58. Fissurina biancae Seguenza.

F. laevigata Reuss, 1849 (*non Oolina laevigata* d'Orbigny), Denkschr. Akad. Wiss. Wien, 1, p. 366, pl. 46, fig. 1.

F. biancae Seguenza, 1862, Foram. Monot. Marne Mioceñ. Distretto Messina, p. 57, pl. 1, figs. 48-50.

Lagena biancae: Heron-Allen and Earland, 1932, Discovery Repts., 4, p. 372, pl. 10, figs. 35-39.

One good example. This species has frequently been recorded under the name of *Lagena laevigata* (Reuss) which is preoccupied by an earlier species described by d'Orbigny.

59. Fissurina subquadrata, sp. nov. (Pl. IX., figs. 5 *a*, *b*).

Test much compressed, subquadrate in outline, periphery bluntly carinate; surface with two shallow grooves on each face, parallel to the outside margin and almost meeting at the base; aperture fissurine, extending almost the full width of the test, and opening into a centrally placed entosolenian tube.

Length, 0·4 mm.

Two specimens. *F. quadrata* (Williamson), which this species resembles in many respects, has the apertural end produced into a short neck and the faces of the test are not grooved.

60. Fissurina lacunata (Burrows and Holland).

Lagena castrensis Brady (*non* Schwager), 1884, p. 485, pl. 60, figs. 1, 2

L. lacunata Burrows and Holland, in Jones, 1895, Pal. Soc., vol. for 1895, p. 205, pl. 7, figs. 12 *a*, *b*.

There are many specimens similar to Brady's fig. 1, which was from Bass Strait. In *F. castrensis*, the faces of the test are beaded and not pitted as in *F. lacunata*.

61. Fissurina contusa, sp. nov. (Pl. IX., fig. 6).

Lagena castrensis (?) Brady (*non* Schwager), 1884, pl. 60, fig. 3.

Test compressed, the central body portion nearly circular, apertural end slightly extended; periphery with a moderately sharp keel which surrounds the test and on either side of which is a secondary lateral keel slightly raised above the general surface; wall on the body portion ornamented with a number of small pits which vary in size; aperture fissurine, elongate, and opening into an entosolenian tube which extends about half way down one face of the test and is recurved at its inner end.

Length, 0·35 mm.

This appears to be the same form as that figured by Brady from off Raine Island, Torres Strait, 155 fms., under the name of *Lagena castrensis?* It is common in Bass Strait, and, while usually occurring with *F. lacunata,* differs from this species in its apertural characters and in the weaker pitting of the surface.

62. FISSURINA ORBIGNYANA (Seguenza), variety (Pl. IX., fig. 7).

There are ten examples of a form of *F. orbignyana,* which in front view is pyriform, with the apertural end only slightly extended and the central portion of the test on each side bearing a white, horse-shoe shaped marking, the rounded end of which is directed towards the base of the test.

63. FISSURINA LAGENOIDES (Williamson) (Refs., Cushman, 1923, p. 30).

One fairly typical example.

64. ENTOSOLENIA GLOBOSA (Montagu) (Refs., Cushman, 1923, p. 20).

Numerous specimens. They are nearly all faintly hispid, but one has the surface thickenings developed to such an extent that it could be referred to *E. ampulla-distoma* (Rymer Jones).

65. ENTOSOLENIA SQUAMOSA (Montagu) (Refs., Cushman, 1923, p. 51).

One very typical specimen.

Family POLYMORPHINIDAE.

66. GUTTULINA YABEI Cushman and Ozawa (Refs., Parr and Collins, 1937, p. 192).

Two small examples.

67. GUTTULINA REGINA (Brady, Parker, and Jones) (Refs., Parr and Collins, 1937, p. 193).

Many specimens. A series of abnormal examples of this species from Barwon Heads has been figured by Parr and Collins.

68. GUTTULINA LACTEA (Walker and Jacob) (Refs., Parr and Collins, 1937, p. 195).

Rare, but typical.

69. GUTTULINA SEGUENZANA (Brady) (Refs., Parr and Collins, 1937, p. 196).

Rare. This is already known from the Victorian coast.

70. GLOBULINA GIBBA d'Orbigny, var. *globosa* (Münster) (Refs., Parr and Collins, 1937, p. 199).

Common. There are many fistulose specimens.

71. POLYMORPHINA HOWCHINI Cushman and Ozawa (Refs., Parr and Collins, 1937, p. 202).

Several examples.

72. SIGMOMORPHINA WILLIAMSONI (Terquem) (Refs., Parr and Collins, 1937, p. 205).

Two specimens. This has been previously figured by the writer from Hobson's Bay.

73. SIGMOIDELLA ELEGANTISSIMA (Parker and Jones) (Refs., Parr and Collins, 1937, p. 206).

Six small examples.

Family HETEROHELICIDAE.

74. BOLIVINELLA FOLIUM (Parker and Jones) (Refs., Parr, 1932, p. 223).

Several worn examples.

Family BULIMINIDAE.

75. BULIMINELLA ELEGANTISSIMA (d'Orbigny) (Refs., Brady, 1884, p. 402).

Two good examples.

76. BULIMINOIDES WILLIAMSONIANUS (Brady) (Refs., Brady, 1884, p. 408).

Three specimens. This species ranges from Torres Strait down the east coast of Australia and westward to South Australian waters. It is most common in shallow water.

77. BULIMINA MARGINATA d'Orbigny (Refs., Brady, 1884, p. 405).

Three specimens. The Australian examples are usually proportionately shorter than those from Europe.

78. VIRGULINA SCHREIBERSIANA Czjzek.

V. schreibersiana: Cushman, 1937, Cushman Lab. Spl. Publ. No. 9, p. 13, pl. 2, figs. 11-20 (gives refs.).

Several large examples. This species also occurs in Westernport Bay, Victoria.

79. Bolivina compacta Sidebottom (Pl. IX., fig. 8).

B. compacta: Cushman, 1937, Cushman Lab. Spl. Publ. No. 9, p. 135, pl. 17, figs. 22-24 (gives refs.).

Two specimens. Cushman records this species from a number of shallow water dredgings in the tropical Pacific.

80. Bolivina pseudoplicata Heron-Allen and Earland (Pl. IX., fig. 9).

B. pseudoplicata: Cushman, 1937, Cushman Lab. Spl. Publ. No. 9, p. 166, pl. 19, figs. 12-20 (gives refs.).

Typical examples are common.

81. Rectobolivina digitata, sp. nov. (Pl. IX., fig. 10).

Test elongate, compressed, straight or slightly curved, with the margins lobulate, biserial portion with a slight median depression on each of the broad faces, uniserial portion also depressed in the upper part of the centre of each chamber; sutures distinct, often a little depressed; chambers numbering 6 to 8 in the biserial portion, with 5 or 6 in the uniserial portion; wall calcareous, smooth, fairly coarsely perforate except along the median line; aperture elliptical, with a rounded rim. Length, 0·6 mm.; breadth, 0·15 mm.

There are two examples from Barwon Heads and I have a number from the Post-Tertiary of Victorian Mines Department Bore No. 5, Parish of Wannaeue, near Rosebud, 177-187 feet. This species differs from the well-known Indo-Pacific Recent species, *R. bifrons* (Brady), in its more irregular build, greater number of biserial chambers, less compressed uniserial portion, and more coarsely perforated test.

82. Reussella armata (Parr) (Refs., Parr. 1932, p. 224).

Three examples. The only previous record of this species is from shore sand, Hardwicke Bay, South Australia.

83. Chrysalidinella dimorpha (Brady) (Refs., Brady, 1884, p. 388).

One specimen. It is proportionately narrower and more heavily built than are the tropical examples of this species.

84. Uvigerina sp. cf. pigmea d'Orbigny.

There are six specimens of the form I have recorded (1939, Mining Geol. Journ., 1 (4), p. 68, pl., fig. 14) from the Lower Pliocene of Gippsland. It is probably not d'Orbigny's *U. pigmea*, but this cannot at present be determined with certainty.

85. SIPHOGENERINA RAPHANUS (Parker and Jones) (Refs., Parr, 1932, p. 225).

Examples are frequent and typical.

86. ANGULOGERINA ANGULOSA (Williamson).

Uvigerina angulosa Williamson, 1858, Recent Foram. Gt. Britain, p. 67, pl. 5, fig. 140.

There are three specimens similar to examples of the typical British form of this species from Dog's Bay, Ireland.

Family CASSIDULINIDAE.

87. CASSIDULINA LAEVIGATA d'Orbigny (Refs., Brady, 1884, p. 428).

One small specimen.

88. CASSIDULINA SUBGLOBOSA Brady (Refs., Cushman, 1922, p. 127).

Three small specimens.

89. EHRENBERGINA PACIFICA Cushman.

E. pacifica Cushman, 1927, Proc. U.S. Nat. Mus., 70, Art. 16, p. 5, pl. 2, figs. 2 *a-c*.

One small example. This species is common off the coast of New South Wales.

Family DELOSINIDAE.

90. DELOSINA COMPLANATA Earland (Pl. X., figs. 1, 2).

Polymorphina complexa Sidebottom, 1907, Mem. Proc. Manchester Lit. Phil. Soc., 51 (9), p. 16, pl. 4, figs. 4, 8, (?) 9. Heron-Allen and Earland, 1916, J.R.M.S., p. 48, pl. 8, figs. 5-7.

Delosina complanata Earland, 1934, Discovery Reports, 10, p. 128.

One of the most interesting occurrences in the shore gatherings from Barwon Heads is that of numerous examples of the genus *Delosina*. The specimens are exceptionally well developed and are very variable in form. Generally, however, the chambers are almost biserially opposed on a plan similar to the chambers in the genus *Sigmomorphina*. The plan of growth is best shown in the large compressed specimens, one of which is represented by fig. 2 of Pl. X. While Earland has described the chambers as at first triserial rapidly becoming biserial and opposed, the chambers in the Victorian examples appear to be biserial from the beginning but in the early stages are separated by a greater angle than the

later chambers, giving a twisted effect to the test when viewed from the base. The Wiesner canals with the needle-stitch-like openings through which they communicate with the exterior of the test are recognisable in all specimens. There are usually a number of pits on the surface of the end of that last-formed chamber, but there is no general aperture. In one specimen sectioned, the first two chambers showed a comparatively large, rounded, terminal opening; This may, however, be due to the resorption of the end of the chamber.

According to Earland, *D. complanata* always occurs in the Mediterranean with *D. complexa* and with about equal rarity. He also records the species from South Cornwall and from off Cape Horn. This gives it a very wide distribution. In addition to the Barwon Heads examples, I have met with the species in a number of dredgings from Bass Strait, and in shore sands from the north coast of Tasmania.

The Victorian specimens are usually half as large again as those figured by Sidebottom from the Eastern Mediterranean, attaining a length of 0·75 mm.

Family ROTALIIDAE.

91. PATELLINA CORRUGATA Williamson.

P. corrugata Williamson, 1858, Recent Foram, Gt. Britain, p. 46, pl. 3, figs. 86-89. Parr and Collins, 1930, Proc. Roy. Soc. Vic., n.s. 43 (1), p. 90, pl. 4, figs. 1-5.

Two examples.

92. ANNULOPATELLINA ANNULARIS (Parker and Jones) (Refs., Parr, 1932, p. 225).

Many specimens.

93. PATELLINELLA INCONSPICUA (Brady).

P. inconspicua: Parr and Collins, 1930, Proc. Roy. Soc. Vic., n.s. 43 (1), p. 92, pl. 4, fig. 7 (gives refs.).

Typical examples occur frequently.

94. DISCORBIS DIMIDIATUS (Jones and Parker) (Refs., Parr, 1932, p. 227).

Common. This is the most abundant species of *Discorbis* on the southern coast of Australia.

95. DISCORBIS GLOBULARIS (d'Orbigny) (Refs., Cushman, 1931, p. 22).

One example, more depressed than usual, and with a subcarinate margin to the test.

96. DISCORBIS GLOBULARIS (d'Orbigny), var. *anglica* Cushman (Pl. IX., figs. 11 *a-c*).

D. globularis, var. *anglica* Cushman, 1931, p. 23, pl. 4, figs. 10*a-c*.
D. irregularis Parr (*non Discorbina irregularis* Rhumbler), 1943, Malac. Soc. Sth. Aust. Publ. No. 3, p. 16.

Many specimens. I previously recorded this form as *D. irregularis* (Rhumbler), which in most respects is resembles, but the specimens do not have the several apertures found on the peripheral margin of the later chambers in Rhumbler's species from the tropical Pacific.

97. DISCORBIS AUSTRALIS Parr (Refs., Parr, 1932, p. 227).

This species was described from San Remo, Victoria. It is common at Barwon Heads.

98. DISCORBIS PATELLIFORMIS (Brady) (Refs., Brady, 1884, p. 647).

This well-known Indo-Pacific species is represented by a few small examples.

99. DISCORBIS AUSTRALENSIS Heron-Allen and Earland.

Discorbina pileolus Brady (*non Valvulina pileolus* d'Orbigny), 1884, p. 649, pl. 89, figs. 2-4 (and later authors).
Discorbis australensis Heron-Allen and Earland, 1932, Discovery Repts., 4, p. 416. Parr, 1939, Mining and Geol. Journ., 1 (4), p. 68.

This species is well known from the east coast of Australia under the name of *D. pileolus*. At Barwon Heads it occurs frequently.

100. DISCORBIS OPERCULARIS (d'Orbigny) (Refs., Brady, 1884, p. 650).

Rare.

101. DISCORBIS KENNEDYI, sp. nov. (Pl. IX., figs. 12 *a*, *b*, 13, 14 *a*, *b*).

Test depressed conical, ventral side slightly concave, periphery subacute; chambers not distinct, 4 to 5 in the last-formed whorl, regularly increasing in size, overlapping on the ventral side; spiral suture depressed in the later part of the test, chamber sutures directed backwards and slightly curved on the dorsal side, usually indistinct, almost radial and somewhat depressed on the ventral side; wall irregularly thickened so as to give an arenaceous appearance to the surface, finely perforate, the periphery limbate; aperture ventral, at the base of the last-formed chamber, opening into the umbilical depression; colour white to pale-brown.

Diameter, 0·4 mm.

There are eleven examples of this species, which appears to be a local form, as I have not met it elsewhere on the Australian coast or in material from other parts of the world. The under side of the last-formed chamber is easily broken, as every specimen is incomplete in this respect. The rough surface texture and the usually brownish colour give an appearance like that of some species of *Trochammina*. I have pleasure in associating the name of Mr. Arthur Kennedy, of the Victorian Department of Mines, with this species.

102. DISCORBIS WILLIAMSONI Chapman and Parr (Pl. X., figs. 3 *a*, *b*).

D. williamsoni Chapman and Parr M.S.: Parr, 1932, p. 226, pl. 21, fig. 25 (gives earlier refs.). Chapman and Parr, 1937, Aust. Antarctic Exped. 1911-14, Sci. Repts. [C.], 1 (2), p. 105, pl. 8, fig. 23.

Many examples.

103. DISCORBIS PULVINATUS (Brady) (Ref., Brady, 1884, p. 650).

Three typical specimens. This species is common in shallow water on the south coast of Australia.

104. DISCORBIS BERTHELOTI (d'Orbigny) (Refs., Cushman, 1931, p. 16).

Two small specimens.

105. DISCORBIS RARESCENS (Brady) (Pl. X., figs. 5 *a-c*) (Ref., Brady, 1884, p. 651).

Three examples. Brady's specimens were from off Raine Island, Torres Strait, 155 fms., and off the Philippines, 95 fms.

106. DISCORBIS GROSSEPUNCTATUS, sp. nov. (Pl. X., figs. 4 *a-c*).

Test plano-convex, oval, peripheral margin limbate, bluntly keeled; chambers, usually four in the final whorl the last much larger than the others; sutures slightly depressed, distinct, almost radial on the dorsal side, limbate and strongly recurved on the ventral side; wall very coarsely perforate on the dorsal side, smooth and finely perforate ventrally, with a deposit of shell material in the centre of the test; aperture not clearly visible but possibly a very low slit extending from near the periphery along the base of the last-formed chamber to near the centre of the test. The curvature of the sutures on the flat side of the test suggests that this species would be better referred to *Cibicides*.

Greater diameter, 0·65 mm.; lesser diameter, 0·4 mm.

Two specimens. I have other examples from the Middle Miocene of Mines Department bore No. 1, Parish of Yulecart, near Hamilton, 80-85 ft. This is not a typical *Discorbis*, but resembles *D. rarescens* and some of the forms referred by authors to *D. bertheloti*, in which the earlier whorls are visible only on the ventral side. The aperture cannot be determined with certainty, and it is possible that it is absent. A similar difficulty is frequently experienced in detecting the ventral aperture in species of *Discorbinella*.

107. HERONALLENIA LINGULATA (Burrows and Holland).

H. lingulata: Chapman, Parr, and Collins, 1934, Journ. Linn. Soc. (London)—Zool., 38, p. 564, pl. 8, figs. 11*a-c* (gives refs.).

Three typical examples.

108. HERONALLENIA TRANSLUCENS, sp. nov. (Pl. IX., figs. 15, 16).

Test small, suboval in outline, compressed, dorsal side more convex than the ventral which is depressed in the median portion, peripheral margin subacute and slightly keeled; chambers few, arranged in one and a half whorls, with six chambers in the outside whorl; sutures distinct, limbate, flush, recurved on the dorsal side and nearly radial on the ventral; wall smooth, finely perforate, usually translucent; aperture ventral, an elongate opening extending from the umbilical area towards the front of the last-formed chamber. Length, up to 0·35 mm.

This species is represented by two examples and it also occurs in dredgings from Bass Strait. It differs from described species of *Heronallenia* in its well-inflated test, flush dorsal sutures, and the absence of any thickening of the shell wall on the upper surface.

109. DISCORBINELLA BICONCAVA (Jones and Parker).

Discorbina biconcava Jones and Parker, in Carpenter, 1862, Intro. Study Foram., p. 201, text-fig. 32 G. Brady, 1884, p. 653, pl. 91, fig. 2 (*non* 3).

Planulinoides biconcavus: Parr, 1941, Mining and Geol. Journ., 2 (5), p. 305, text-fig. (after Brady).

There are many examples of this typically Southern Australian species. Since erecting the genus *Planulinoides* for its reception, I have recognized the presence in some specimens of the normal ventral discorbine aperture in addition to that on the periphery. *Planulinoides* should therefore be suppressed and the species referred to *Discorbinella*.

110. DISCORBINELLA PLANOCONCAVA (Chapman, Parr, and Collins) (Pl. XI., figs. 1, 2).

Planulina biconcava (Jones and Parker), var. *planoconcava* Chapman, Parr, and Collins MS., in Parr, 1932, p. 232, pl. 22, figs. 34 *a-c*.

Discorbis planoconcava Chapman, Parr, and Collins, 1934, Journ. Linn. Soc. (London)—Zool., 38, p. 561, pl. 11, figs. 40 *a-c*.

There are sixteen examples of this species, which was described from the Middle Miocene of Victoria and also recorded as a Recent form from shore sand, Point Lonsdale, Victoria.

111. Discorbinella disparilis (Heron-Allen and Earland) (Pl. XI., figs. 3 *a-c*) (Refs., Parr, 1932, p. 230).

There are 22 specimens. Like the preceding species, this is a typical *Discorbinella*, with two apertures, one peripheral and the other ventral. It was originally described from off New Zealand, 100 fms., and later recorded by the writer from shore sand, Victoria, and Hardwicke Bay, South Australia.

112. Discorbinella involuta (Sidebottom).

Discorbina involuta Sidebottom, 1918, J. R. M. S., p. 255, pl. 6, figs. 15-17.

Four specimens. Sidebottom's record was from off the coast of New South Wales, 465 fms. The species is widely distributed on the east coast of Australia and in Bass Strait.

113. Valvulineria collinsi (Parr).

Discorbis collinsi Parr, 1932, p. 230, pl. 22, figs. 33 *a-c*.

Seven specimens. The original record of this species was from shore sand, Port Fairy, Victoria.

114. Tretomphalus concinnus (Brady) (Pl. XI., figs. 4, 5).

T. concinnus: Cushman, 1934, Contrbns. Cushman Lab. Foram. Research, 10 (4), p. 96, pl. 11, figs. 8, 9; pl. 12, figs. 13-15 (gives Brady's ref.).

Examples were very common in one gathering.

115. Tretomphalus planus Cushman.

T. planus Cushman, 1934. Contrbns. Cushman Lab. Foram. Research, 10 (4), p. 94, pl. 11, figs. 11*a-c;* pl. 12, figs. 18-22.

Like the preceding, this species was very common in one gathering. While the majority of the specimens have the depressed, cushion-like shape represented by Cushman's fig. 11 *b*, many are subglobular because of the deeper, more rounded balloon chamber. The number of *Cymbaloporetta*-like chambers underlying the balloon chamber is usually four, but is sometimes five. Cushman described this species from off Samoa, 7 fms., and he gives other records from the tropical Pacific. The genus *Tretomphalus* is, from published records, typically of tropical habitat, and its occurrence in such numbers at Barwon Heads is therefore unusual. Occasional examples of *T. concinnus* occur in Victorian shore sands and in dredgings from Bass Strait, but this is the only occasion on which I have met with *T. planus* in this area. Mr. Arthur Earland, F.R.M.S. (1902, Journ. Quekett Micr. Club, [2], 8, (51), pp. 309-322) has recorded a remarkable occurrence of *Tretomphalus* at Corny Point, on Hardwicke Bay, Spencer Gulf, South Australia. From his description, it appears that the species he had was *T. concinnus*.

116. EPONIDES CONCENTRICUS (Parker and Jones) (Pl. XI., figs. 6 *a, b*) (Refs., Cushman 1931, p. 43).

Frequent. The characters of this species suggest that it might be referred to *Mississippina* rather than to *Eponides*.

117. STREBLUS BECCARII (Linné) (Refs., Cushman, 1931, p. 58).

Many specimens. They do not attain the development of the species as it occurs in the Adriatic Sea, but are exactly similar to British examples Mr. Arthur Earland has sent me from Tents Muir, Fifeshire, Scotland. The usual number of chambers in the outside whorl is ten.

118. STREBLUS PAUPERATUS Parr.

Rotalia perlucida Parr (*non* Heron-Allen and Earland), 1932, p. 211, pl. 22, figs. 35*a-c*.

Streblus pauperatus Parr, 1941, Mining and Geol. Journ, 2 (5), p. 305.

Two examples. The previous record of this species was from shore sand, Hardwicke Bay, South Australia.

119. NOTOROTALIA CLATHRATA (Brady).

Rotalia clathrata Brady, 1884, p. 709, pl. 107, fig. 8 (*non* 9).

Notorotalia clathrata: Finlay, 1939, Trans. Roy. Soc. N.Z., 68, p. 518 (note under *N. zelandica* Finlay).

Several examples. This is a common Bass Strait species.

120. CANCRIS sp. (Pl. XI., figs. 7 *a-c*).

The figures represent what appears to be a species of *Cancris*. The test is roughly ear-shaped in outline, with a lobulated periphery. The chambers, which are inflated, increase rapidly in size as added and the sutures are well depressed. The greater part of the face of the last-formed chamber is occupied by a clear, apparently imperforate, area. The base of this is extended as a lip under which the aperture opens into the umbilical cavity. While the species is probably new, there are too few specimens available to enable its characters to be fully determined.

121. BAGGINA PHILIPPINENSIS (Cushman).

Cancris philippinensis: Parr, 1939, Mining and Geol. Journ., 1 (4), p. 69, pl., figs. 18*a-c* (gives refs.).

Five small specimens. This species occurs frequently in dredgings off the coast of New South Wales, at depths of about 100 fms., and is common in the Pliocene of Victoria.

122. Anomalina nonionoides Parr (Refs., Parr, 1932, p. 231).

There are ten specimens. This species was described by the writer from shore sand, Narrabeen, New South Wales, and also recorded from shore sand, Torquay, Victoria.

123. Cibicides lobatulus (Walker and Jacob) (Refs., Cushman, 1931, p. 118).

Examples are common. In addition to the usual form of this species, there are many specimens showing a *Dyocibicides* plan of growth and three with the chambers arranged as in *Rectocibicides*. Some English examples of *C. lobatulus* also develop a biserial habit of growth, although I have not seen any with as many biserial chambers as those from Barwon Heads.

124. Planorbulina mediterranensis d'Orbigny (Refs., Cushman, 1931, p. 129).

There are numerous examples of the very well-developed form so common in Victorian shore sands. This is possibly not the same as d'Orbigny's species.

125. Acervulina inhaerens Schultze (Refs., Cushman, 1931, p. 134).

Several specimens.

126. Gypsina vesicularis (Parker and Jones) (Refs., Cushman, 1931, p. 135).

Six specimens. They are almost hemispherical in shape, and are very neatly built.

127. Miniacina mineacea (Pallas).

Polytrema mineaceum: Heron-Allen and Earland, 1922, Brit. Antarctic ("Terra Nova") Expedn., 1910, Nat. Hist. Rept., Zool., 6 (2), p. 221, pl. 8, figs. 1-31.

Recognizable fragments only. This species is common on the coast of New South Wales.

Family CHILOSTOMELLIDAE.

128. Sphaeroidina bulloides d'Orbigny (Refs., Cushman, 1924, p. 36).

Small specimens.

Family ORBULINIDAE.

129. GLOBIGERINA BULLOIDES d'Orbigny.

G. bulloides d'Orbigny, 1826, Ann. Sci. Nat., 7, p. 277, No. 1; Modèles Nos. 17, 76. Cushman, 1941, Contrbns. Cushman Lab., 17 (2), p. 38, pl. 10, figs. 1-13.

Frequent, but small.

130. GLOBIGERINA INFLATA d'Orbigny (Refs., Cushman, 1924, p. 12).

Frequent.

131. GLOBIGERINOIDES RUBER (d'Orbigny) (Refs., Cushman, 1924, p. 15).

Seven specimens. Like all other Southern Australian examples of this species I have seen, they are colourless.

132. ORBULINA UNIVERSA d'Orbigny (Refs., Cushman, 1924, p. 28).

Several examples.

133. GLOBOROTALIA HIRSUTA (d'Orbigny) (Refs., Cushman, 1931, p. 99).

This pelagic species is represented by a single example.

124. GLOBOROTALIA TRUNCATULINOIDES (d'Orbigny) (Refs., Cushman, 1931, p. 97).

Typical examples.

Family NONIONIDAE.

135. NONION DEPRESSULUS (Walker and Jacob).

N. depressulum: Cushman, 1939, U.S. Geol. Survey Prof. Paper 191, p. 20, pl. 5, figs. 22-25 (gives refs.).

Rare. The specimens are similar to some I have from Bognor, England.

136. NONION SCAPHA (Fichtel and Moll).

N. scapha: Cushman, 1939, U.S. Geol. Surv. Prof. Paper 191, p. 20, pl. 5, figs. 18-21 (gives refs.).

Four examples of the typical form of this species. The number of chambers in the last-formed coil varies from eleven to twelve.

137. Elphidium sp. cf. simplex Cushman (Pl. XI., fig. 8).

Cf. *E. simplex* Cushman, 1939, U.S. Geol. Survey Prof. Paper 191, p. 62, pl. 17, fig. 10 (gives refs.).

There are several examples of a species of *Elphidium* which may be a temperate water form of *E. simplex*, described by Cushman from off Tonga, in the South Pacific. The retral processes are better defined than in Cushman's figure, and there is no boss in the umbilical region, which is merely granulated.

138. Elphidium sp. aff. articulatum (d'Orbigny) (Pl. XI., figs. 9 *a, b*).

Cf. *E. articulatum*: Cushman, 1939, U.S. Geol. Survey Prof. Paper 191, p. 53, pl. 14, figs. 18, 19.

The specimens agree with *E. articulatum* in the shape and number of chambers to a whorl (10), but the test is narrower in apertural view in the earlier portion and the umbilical region is superficially thickened. *E. articulatum* was described from the vicinity of the Falkland Islands.

139. Elphidium advenum (Cushman)

E. advenum (Cushman): Cushman, 1939, U.S. Geol. Survey Prof. Paper 191, p. 60, pl. 16, figs. 31-35 (gives refs.).

Several examples. They resemble fig. 1 of Pl. 110 of the "Challenger" Report.

140. Elphidium argenteum, sp. nov. (Pl. XII. figs. 7 *a, b*.).

Test comparatively large, compressed, periphery subacute with a small blunt keel, margin slightly lobulated, sides nearly parallel in front view, umbilical regions moderately depressed with the surface thickened; chambers numerous, 15–17 in the last-formed whorl, slightly inflated; sutures recurved, obscured by the retral processes, which are rod-like and fairly conspicuous, averaging about 12 in number; surface closely and finely beaded, giving a silvery appearance to the test; aperture a series of rounded openings situated a short distance above the base of the apertural face. Diameter, up to 1 mm.; thickness, to 0·35 mm.

This is the commonest species of *Elphidium* in Victorian shore sands. It is apparently the same species as that recorded by Chapman (1907, p. 141) as *Polystomella striatopunctata* (Fichtel and Moll) from a number of Victorian littoral gatherings, but Fichtel and Moll's figures show that their species is an unrelated form. Like most species of *Elphidium*, *E. argenteum* appears to be restricted in its occurrence. *E. advenum*, var. *margaritacea* Cushman, from off Rhode Island, U.S.A., shows some resemblance to it but has fewer chambers and retral processes.

141. Elphidium macellum (Fichtel and Moll).

E. macellum (Fichtel and Moll): Cushman, 1939, U.S. Geol. Surv. Prof. Paper 191, p. 51, pl. 14, figs. 1-3; pl. 15, figs. 9, 10.

Several specimens.

142. Elphidium imperatrix (Brady) (Refs., Brady, 1884, p. 738).

Three immature examples. This species appears to be confined to an area extending along the east coast of Australia from near Sydney to Tasmania.

Explanation of Plates.

Plate VIII.

Figs. 1, 2.—*Ammodiscus mestayeri* Cushman × 40.

Fig. 3.—*Webbinella bassensis*, sp. nov. Holotype. × 40.

Fig. 4.—*Trochammina inflata* (Montagu). × 40.

Fig. 5.—*Eggerella* sp. × 65.

Fig. 6.—*Quinqueloculina baragwanathi*, sp. nov. Holotype. *a*, *b*, opposite sides. × 40; *c*, apertural view, × 65.

Fig. 7.—*Triloculina bassensis*, sp. nov. Holotype. *a*, *b*, opposite sides. × 40; *c*, apertural view, × 65.

Fig. 8.—*Nevillina coronata* (Millett). Biloculine specimen. *a*, front view. × 40; *b*, side view. × 35.

Fig. 9.—*Spirillina denticulogranulata* Chapman, var. *pulchra* nov. *a*, *b*, opposite sides; *c*, peripheral view. × 65.

Plate IX.

Fig. 1.—*Spirillina denticulogranulata* Chapman, var. *pulchra*, nov. Holotype of variety. *a*, *b*, opposite sides. × 55; *c*, peripheral view. × 65.

Fig. 2.—*Spirillina runiana* Heron-Allen and Earland. *a*, dorsal view; *b*, peripheral view. × 65.

Fig. 3.—*Spirillina runiana* Heron-Allen and Earland. Ventral aspect. × 65.

Fig. 4.—*Frondicularia compta* Brady, var. *villosa* Heron-Allen and Earland. × 40.

Fig. 5.—*Fissurina subquadrata*, sp. nov. Holotype. *a*, front view; *b*, apertual view. × 65.

Fig. 6.—*Fissurina contusa*, sp. nov. Holotype. Front view. × 65.

Fig. 7.—*Fissurina orbignyana* Seguenza, var. Front view. × 65.

Fig. 8.—*Bolivina compacta* Sidebottom. × 65.

Fig. 9.—*Bolivina pseudoplicata* Heron-Allen and Earland. × 65.

Fig. 10.—*Rectobolivina digitata*, sp. nov. Holotype. × 65.

Fig. 11.—*Discorbis globularis* (d'Orbigny), var. *anglica* Cushman. *a*, dorsal view; *b*, ventral view; *c*, peripheral view. × 65.

Fig. 12.—*Discorbis kennedyi*, sp. nov. Holotype. *a*, dorsal view; *b*, peripheral view. × 65.

Fig. 13.—*Discorbis kennedyi*, sp. nov. Ventral view of another example. × 65.

Fig. 14.—*Discorbis kennedyi*, sp. nov. Another example, *a*, ventral view; *b*, peripheral view. × 65.

Figs. 15, 16.—*Heronallenia translucens*, sp. nov. Fig. 15. Holotype. Dorsal view. Fig. 16. Ventral view of another example. Both × 65.

Plate X.

Figs. 1, 2.—*Delosina complanata* Earland. Fig. 1, *a*, *b*, opposite sides; *c*, edge view. Fig. 2, *a*, *b*, opposite sides. All × 65.

Fig. 3.—*Discorbis williamsoni* Chapman and Parr, *a*, dorsal view; *b*, ventral view. × 65.

Fig. 4.—*Discorbis grossepunctatus*, sp. nov. Holotype. *a*, dorsal view; *b*, ventral view; *c*, edge view. × 65.

Fig. 5.—*Discorbis rarescens* (Brady), *a*, dorsal view; *b*, ventral view; *c*, edge view. × 65.

Plate XI.

Figs. 1, 2.—*Discorbinella planoconcava* (Chapman, Parr and Collins). Fig. 1, *a*, *b*, dorsal and ventral views. Fig. 2, edge view of another specimen showing peripheral aperture. All × 65.

Fig. 3.—*Discorbinella disparilis* (Heron-Allen and Earland), *a*, dorsal view; *b*, ventral view; *c*, edge view. × 65.

Figs. 4, 5.—*Tretomphalus concinnus* (Brady). Fig. 4, side view. Fig. 5, dorsal view of another specimen. Both × 65.

Fig. 6.—*Eponides concentricus* (Parker and Jones). *a*, dorsal view; *b*, ventral view. × 65.

Fig. 7.—*Cancris* sp. *a*, dorsal view; *b*, ventral view. × 40; *c*, edge view. × 65.

Fig. 8.—*Elphidium* sp. cf. *simplex* Cushman. × 65.

Fig. 9.—*Elphidium* sp. aff. *articulatum* (d'Orbigny). *a*, side view; *b*, apertural view. × 65.

Plate XII.

Fig. 1.—*Planispirina* (?) *bucculenta* (Brady). *a*, side view; *b*, apertural view. × 43.

Fig. 2.—*Quinqueloculina subpolygona*, sp. nov. Holotype. *a*, *b*, opposite sides; *c*, apertural view. × 43.

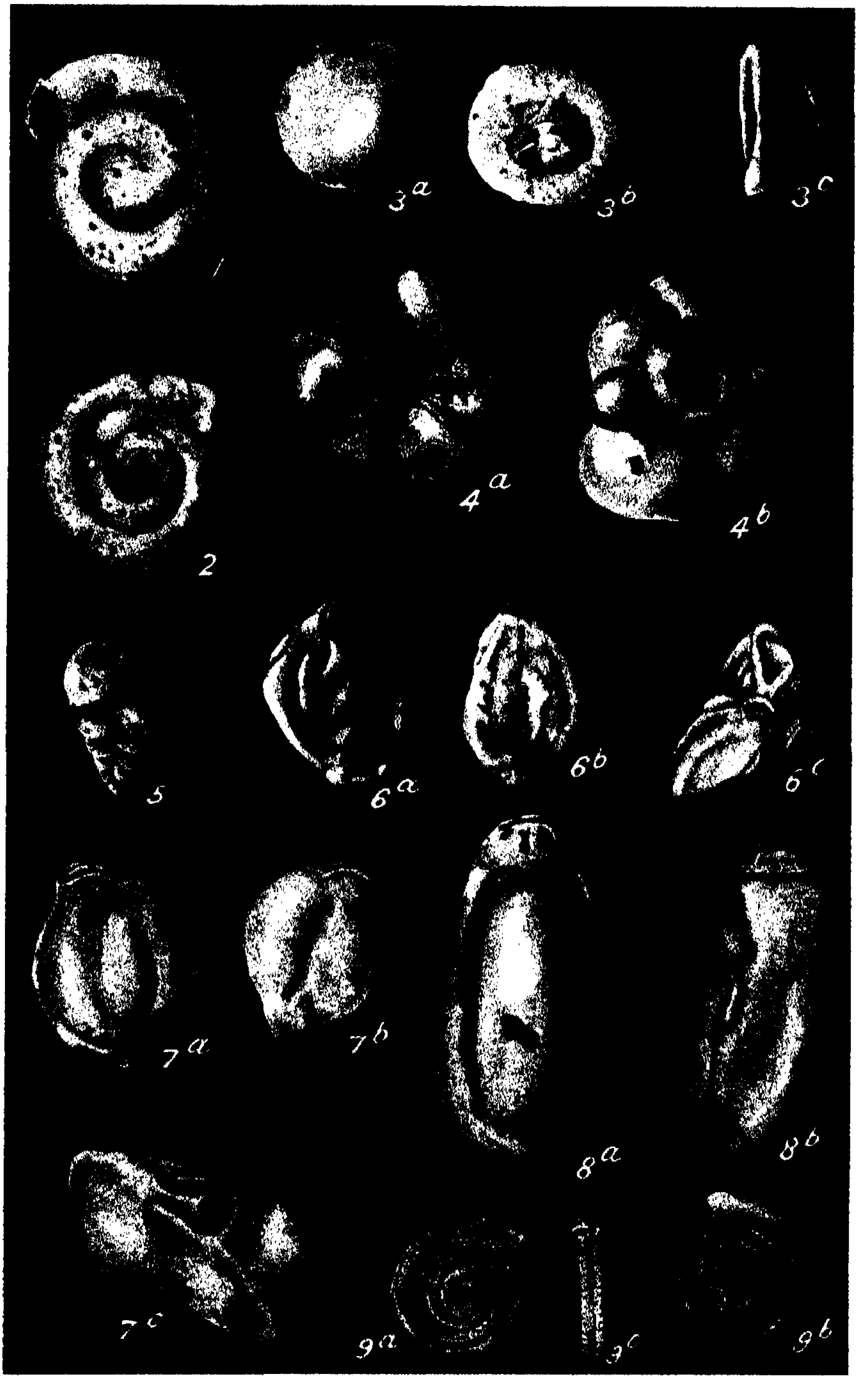
Fig. 3.—*Quinqueloculina baragwanathi*, sp. nov. Front view. × 43.

Fig. 4.—*Vaginulina bassensis*, sp. nov. Holotype. × 43.

Fig. 5.—*Dentalina mutsui* Hada. × 43.

Fig. 6.—*Lagena distoma-margaritifera* Parker and Jones, var. *victoriensis*, nov. Holotype of variety. × 43.

Fig. 7.—*Elphidium argenteum*, sp. nov. Holotype, *a*, side view; *b*, apertural view. × 43.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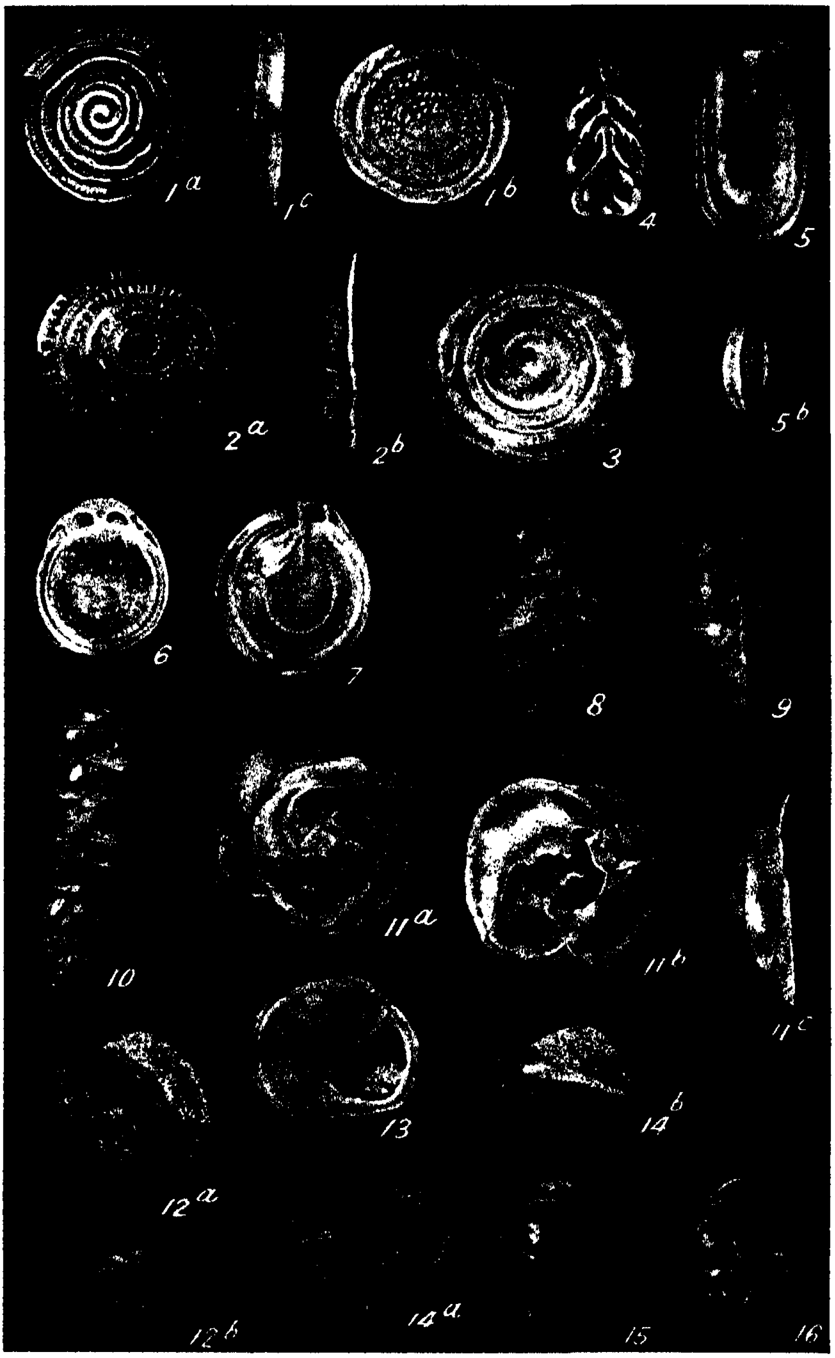
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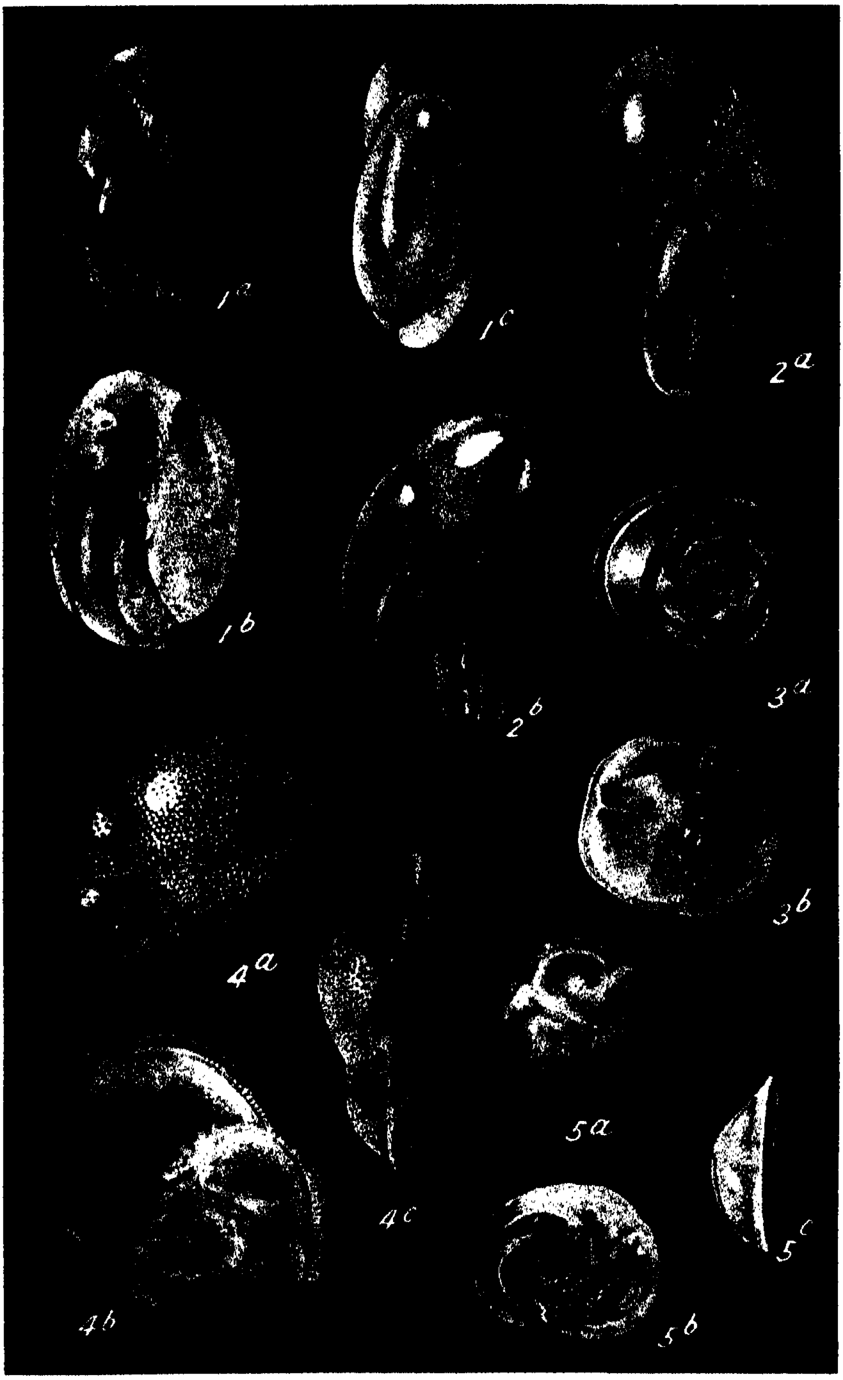
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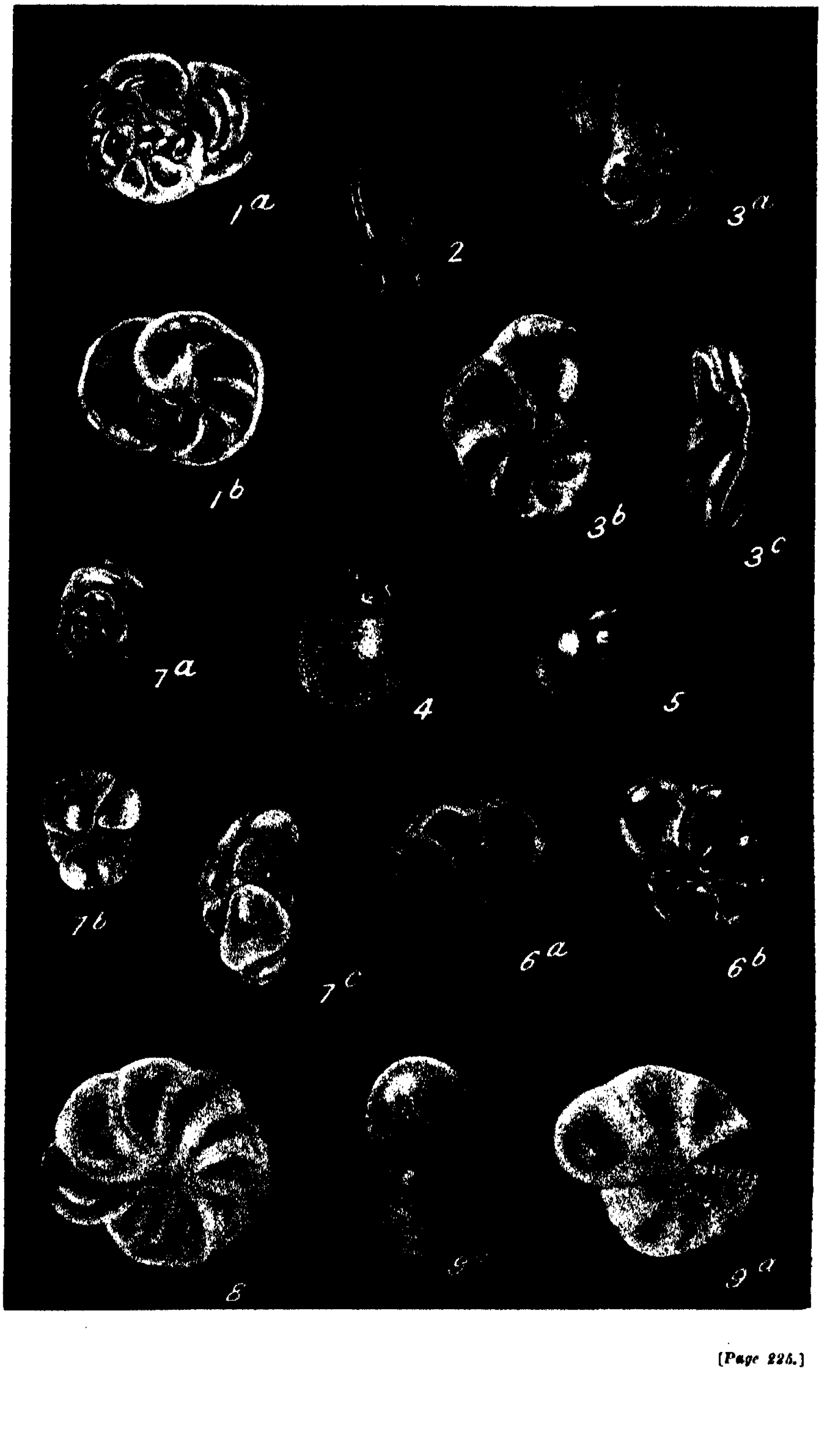
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[PROC. ROY. SOC. VICTORIA, 56 (N.S.), PT. II., 1945.]

ART.—XIII.—*A Catalogue of Type and Figured Specimens of Fossils in the Melbourne University Geology Department.*

By F. A. SINGLETON, D.Sc.

[Read 9th December, 1943; issued separately 30th June, 1945.]

Abstract.

The Geological Museum of Melbourne University contains more than 200 primary or supplementary type specimens. These are listed under the appropriate species, which are arranged alphabetically under larger biological groups. For each, the literature, geological horizon, locality and source are given. The new terms, tectoholotype, tectosyntype, and tectohypotype are proposed.

Contents.

Introduction.

The importance in systematics of type material, as the ultimate basis of nomenclatural species, is now generally recognized. It follows that not only should such type material be carefully preserved in museums, but also that information as to the type specimens contained in each museum should be made generally available.

The catalogue which follows is an endeavour by the author, as curator of the Geological Museum of the University of Melbourne, Australia, to furnish this information for the primary and supplementary type specimens registered in its fossil collections. All registered fossils bear the register number in black ink or in white paint, while type specimens are distinguished by small painted discs which are red in the case of holotypes and syntypes, and green in the case of paratypes and hypotypes. Thin sections of fossils are catalogued separately and bear an independent series of register numbers, but those used in descriptions or figures (tectotypes) are marked as above.

In general, the terminology is that recommended by Frizzell (2), with the addition of Chapman's (1) terms *tectotype* and *tectoparatype*, which were not included in Frizzell's most useful list of terms, and of the new terms *tectoholotype, tectosyntype*, and *tectohypotype* herein proposed. These are defined together with definitions, taken from Frizzell's and Chapman's papers above cited, of the other terms used in this catalogue.

Primary Types.

Holotype—a single specimen (or fragment) upon which a species is based.

Paratype—a specimen, other than the holotype, upon which an original specific description is based.

Syntype—any specimen of the author's original material when no holotype was designated; or any of a series of specimens described as "cotypes" of equal rank.

Supplementary Types.

Hypotype—a described or figured specimen, used in publication in extending or correcting the knowledge of a previously defined species.

Plastotype—any artificial specimen moulded directly from a type.

Tectotype—a specimen, fragmentary or otherwise, which is selected to elucidate the microscopic structure, internal or external, of a species or genus (1, p. 62).

Chapman further states, "A tectotype may be associated, in the case of a species, with the original types (tectoparatype), or with subsequently described specimens (tectoplesiotype)." For this latter term is here substituted *tectohypotype,* in view of the objections to Cossmann's term plesiotype urged by Frizzell (2, pp. 653, 662). In the case of some fossils, notably the stromatoporoids, the original descriptions are commonly based entirely upon thin sections. It seems to the writer that these latter (tectotypes), when prepared from holotype or syntype material, should be termed *tectoholotypes* and *tectosyntypes,* respectively, to distinguish them from those prepared from paratypes, to which the term *tectoparatype* may be restricted. Those who disagree with this proposal will doubtless use tectoparatype to cover all three categories, and should make the necessary changes in the present catalogue, which contains, in addition to type material, figured specimens of fossils not referred to a species, and also a few Recent specimens specifically named and figured in comparison with fossils.

In each biological group the species are arranged alphabetically in order first of generic and then of trivial names. The species name in heavy face type on the left is that under which the type material listed under it was first described. It is, therefore, not necessarily (except in the case of primary types) the earliest name of the species, nor is it necessarily the correct name. Where this latter is known, it is placed on the same line on the right. In several cases, however, notably in the mollusca, the generic location is believed to require alteration but the correct genus for reception of the species has not yet been determined.

Beneath each species name are given references, not necessarily exhaustive, to the literature, and the synonymy. Then follow the register number and other details of the type material in the University of Melbourne; the geological age, not necessarily that attributed by the original author; the locality; and the source of the specimens. In a few instances, explanatory remarks are added. It has been impossible to check some of the references to overseas publications, and the author will be grateful for the pointing out of errors in these or other references.

Papers Cited.

1. F. Chapman.—What are Type Specimens? How should they be named? *Victorian Naturalist,* xxix. (4), pp. 59-64, August, 1912.
2. D. L. Frizzell.—Terminology of Types. *American Midland Naturalist,* xiv. (6), pp. 637-668, November, 1933

PLANTAE.

Antarcticoxylon Priestleyi Seward, 1914:—**Rhexoxylon Priestleyi** (Seward, 1914).

Antarcticoxylon Priestleyi A. C. Seward, Brit. Antarctic ("Terra Nova") Exped., 1910, Geology, 1 (1), p. 17, text fig. 3 (p. 6), pls. 4–7, 8 (pars), 1914.

M.U.G.D. No. 1642. Portion of Holotype in British Museum (Nat. Hist.) Lond.

(?) Permian (Beacon Sandstone series).

West side of medial moraine on Priestley Glacier, Terra Nova Bay, South Victoria Land, Antarctica.

Coll. by Northern Party, Scott's Second Expedition, and pres. by R. E. Priestley, 1935.

Obs.—A small piece from a block in the possession of Dr. Priestley, collected during extraction of the original specimen.

Calamites Macnabi Pritchard, 1910.

Calamites macnabi G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 22 (2), p. 261, April, 1910.

M.U.G.D. No. 1851. Holotype, unfigured.

Permo-Carboniferous [Permian?].

"Lower Gangamopteris quarry overlooking the Korkuperrimal Valley" (Pritchard, loc. cit., 1910) = Lower quarry (Morton's quarry), Bald Hill near Bacchus Marsh, Victoria.

The type material, which is very poorly preserved, consists of about a dozen pieces of sandstone which Dr. Pritchard (verbal communication, 11.10.39) states are all from one face of a block.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Rhexoxylon Priestleyi (Seward, 1914).

See *Antarcticoxylon Priestleyi* Seward, 1914.

PORIFERA.

Protospongia reticulata T. S. Hall, 1889.

Protospongia reticulata T. S. Hall, Proc. Roy. Soc. Vic., n.s., 1, p. 60, pl. 4, figs. 1, 2, June, 1889.

M.U.G.D. No. 1082. Holotype, figured by Hall, loc. cit., 1889.

Lower Ordovician (Bendigonian).

Ironbark, Sandhurst [= Bendigo], Victoria.

Coll. J. E. G. Edwards. Exch. with School of Mines, Bendigo.

Receptaculites australis Salter, 1859.

Receptaculites australis J. W. Salter, Figures and Descriptions of Canadian Organic Remains, Decade 1, Geol. Surv. Canada, p. 47, pl. 10, figs. 8-10, 1859. R. Etheridge and W. S. Dun, Rec. Geol. Surv. N. S. Wales, 6, p. 62, pls. 8-10, 1898. F. Chapman, Proc. Roy. Soc. Vic., n.s., 18 (1), p. 7, pl. 2, figs. 2, 4-7; pl. 3; pl. 4, figs. 2-7, 1905. J. Shirley, Quart. Journ. Geol. Soc. Lond., 94 (4), p. 461, pl. 40, figs. 1-4, 1938. E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 35, pl. 5, figs. 2, 4, 5, 1942.

M.U.G.D. No. 1716. Hypotype, figured by Gill, loc. cit., figs. 2, 4, 1942.

M.U.G.D. No. 1717. Hypotype, counterpart of 1716, figured by Gill, loc. cit., fig. 5, 1942.

Lower Devonian (Yeringian).

Hull Road, Mooroolbark, Victoria. E. D. Gill's Locality No. 13 (Proc. Roy Soc. Vic., n.s., 52 (2), pp. 252 et seq., 1940).

Pres. Rev. E. D. Gill, 24.5.41.

STROMATOPOROIDEA.

Actinostroma compactum Ripper, 1933.

Actinostroma compactum E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 45 (2), p. 153, figs. 5A, B (p. 163), 1st August, 1933. E. A. Ripper, *ibid.*, 50 (1), p. 15, pl. 2, figs. 7, 8, 1937.

M.U.G.D. No. 767. PARATYPE, source of Fossil Sections Nos. 233, 234.

M.U.G.D. No. 767A. Vertical section of paratype No. 767.

M.U.G.D. No. 767B. Tangential section of paratype No. 767.

M.U.G.D. Fossil Section Coll. No. 233. TECTOPARATYPE, vertical section, unfigured, of paratype No. 767.

M.U.G.D. Fossil Section Coll. No. 234. TECTOPARATYPE, tangential section, unfigured, of paratype No. 767.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Sections Nos. 767A and B, though cut from the paratype, were not used in the original work and are therefore not regarded as tectoparatypes.

M.U.G.D. No. 1617. HYPOTYPE, source of Fossil Sections Nos. 154, 155.

M.U.G.D. Fossil Section Coll. No. 154. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., fig. 7, 1937, of hypotype No. 1617.

M.U.G.D. Fossil Section Coll. No. 155. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., fig. 8, 1937, of hypotype No. 1617.

Middle Devonian.

Heath's Quarry, Buchan, Victoria.

Coll. Miss E. A. Ripper, M.Sc., 1933 (Field No. 167).

Actinostroma contortum Ripper, 1937.

Actinostroma contortum E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 14, pl. 2, figs. 3-6, 29th December, 1937.

M.U.G.D. No. 1611. HOLOTYPE, source of Fossil Section No. 106.

M.U.G.D. Fossil Section Coll. No. 106. TECTOHOLOTYPE, vertical section, figured by Ripper, loc. cit., fig. 3, and tangential section, fig. 4, 1937, of holotype No. 1611.

Middle Devonian.

Heath's Quarry, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 122).

M.U.G.D. No. 1604. PARATYPE (finer variety), source of Fossil Sections Nos. 38, 39, 41.

M.U.G.D. Fossil Section Coll. No. 38. TECTOPARATYPE, tangential section, figured by Ripper, loc. cit., fig. 6, 1937, of paratype No. 1604.

M.U.G.D. Fossil Section Coll. No. 39. TECTOPARATYPE, vertical section, figured by Ripper, loc. cit., fig. 5, 1937, of paratype No. 1604.

M.U.G.D. Fossil Section Coll. No. 41. Vertical section, unfigured, of paratype No. 1604.

Middle Devonian.

Rocky Camp, Commonwealth Quarries, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 32).

Actinostroma stellulatum Nicholson var. distans Ripper, 1937.

Actinostroma stellulatum Nicholson, variety *distans* E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 12, pl. 2, figs. 1, 2, 29th December, 1937.

M.U.G.D. No. 1610. HOLOTYPE, source of Fossil Sections Nos. 102-105.

M.U.G.D. Fossil Section Coll. No. 102. TECTOHOLOTYPE, tangential section, figured by Ripper, loc. cit., fig. 2, 1937, of holotype No. 1610.

M.U.G.D. Fossil Section Coll. No. 103. Tectoholotype, vertical section, figured by Ripper, loc. cit., fig. 1, 1937, of holotype No. 1610.

Middle Devonian.

Heath's Quarry, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 121).

Actinostroma verrucosum (Goldfuss, 1826).

Ceriopora verrucosa G. A. Goldfuss, Petrefacta Germaniae, 1, p. 33, pl. 10, fig. 6, 1826.

Stromatopora verrucosa Goldfuss: W. Quenstedt, Petrefakten Deutschlands, 5, p. 560, pl. 141, fig. 10, 1878. A. Bargatzky, Die Stromatoporen des rheinischen Devons, p. 55, 1881.

Actinostroma verrucosum Goldfuss: H. A. Nicholson, Ann. Nat. Hist., [5] 17, p. 228, 1886. H. A. Nicholson, Mon. Brit. Strom., pt. 2, Palaeontogr. Soc Lond., 42, for 1888, p. 134, pl. 16, figs. 1-8, 1889. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 45 (2), p. 154, text figs. 1 (p. 155), 5c, D (p. 163), 1933.

M.U.G.D. No. 1446. Hypotype, source of Fossil Sections Nos. 237, 238.

M.U.G.D. Fossil Section Coll. No. 237. Tectohypotype, tangential section, figured by Ripper, loc. cit., fig. 5D, 1933, of hypotype No. 1446.

M.U.G.D. Fossil Section Coll. No. 238. Tectohypotype, vertical section, figured by Ripper, loc. cit., figs. 1, 5c, 1933, of hypotype No. 1446.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Coll. Miss E. A. Ripper, and pres. 24.10.32.

Clathrodictyon calamosum Ripper, 1933.

Clathrodictyon calamosum E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 45 (2), p. 160, text-figs. 6E, F (p. 164), 1st August, 1933.

M.U.G.D. No. 1448. Paratype, source of Fossil Sections Nos. 239, 240.

M.U.G.D. Fossil Section Coll. No. 239. Tangential section, unfigured, of paratype No. 1448.

M.U.G.D. Fossil Section Coll. No. 240. Vertical section, unfigured, of paratype No. 1448.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Coll. Miss E. A. Ripper, and pres. 24.10.32.

Clathrodictyon aff. **chapmani** Ripper, 1933.

Clathrodictyon chapmani E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 45 (2), p. 159, text-figs. 4 (p. 158), 6c, D (p. 164), 1st August, 1933.

Clathrodictyon aff. *chapmani* E. A. Ripper, *ibid.*, 50 (1), p. 3, pl. 1, figs. 3, 4, 1937.

M.U.G.D. No. 1598. Hypotype, source of Fossil Sections Nos. 168, 169.

M.U.G.D. Fossil Section Coll. No. 168. Tectohypotype, vertical section, figured by Ripper, loc. cit., fig. 3, 1937, of hypotype No. 1598.

M.U.G.D. Fossil Section Coll. No. 169. Tectohypotype, tangential section, figured by Ripper, loc. cit., fig. 4, 1937, of hypotype No. 1598.

Lower Devonian.

Griffith's Quarry, Allot. 131, Loyola, Victoria.

Coll. Miss E. A. Ripper, [illegible] (Field No. [illegible]).

Clathrodictyon clarum Počta, 1894.

Clathrodictyon clarum P. Počta, Syst. Sil. du Centre de la Bohême, 8 (1), p. 152, pl. 18, figs. 7, 8, 1894. P. Počta, Sitzungsber. Königl. Böhm. Gesells. d. Wissensch. Prag, No. 12, p. 1 and pl., 1910. D. Le Maitre, Mém. Soc. Géol. France, n.s., 9 (1), Mém. 20, p. 16, pl. 4, figs. 1-5, 1933. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 21, pl. 4, figs. 3, 4, 1937.

M.U.G.D. No. 1605. Hypotype, source of Fossil Sections Nos. 53, 54.

M.U.G.D. Fossil Section Coll. No. 53. Tectohypotype, vertical section, figured by Ripper, loc. cit., fig. 3, 1937, of hypotype No. 1605.

M.U.G.D. Fossil Section Coll. No. 54. Tectohypotype, tangential section, figured by Ripper, loc. cit., fig. 4, 1937, of hypotype No. 1605.

Middle Devonian.

Rocky Camp, Commonwealth Quarries, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 48).

Clathrodictyon confertum Nicholson, 1889.

Clathrodictyon confertum H. A. Nicholson, Mon. Brit. Strom., pt. 2, Palaeontogr. Soc. Lond., 42, *for 1888*, p. 154, pl. 18, figs. 13, 14, March, 1889. K. Boehnke, Palaeontographica, 61, p. 170, figs. 15, 16, 1915. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 18, pl. 3, fig. 3, 1937.

M.U.G.D. No. 1607. Hypotype, source of Fossil Sections Nos. 88, 89.

M.U.G.D. Fossil Section Coll. No. 88. Vertical section, unfigured, of hypotype No. 1607.

M.U.G.D. Fossil Section Coll. No. 89. Tectohypotype, vertical section, figured by Ripper, loc. cit., 1937, of hypotype No. 1607.

Middle Devonian.

Cameron's Quarry, South Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 78).

Clathrodictyon convictum Yavorsky, 1929.

Clathrodictyon convictum B. Yavorsky, Bull. Com. Géol. Leningrad, 48 (1), pp. 91, 105, pl. 6, fig. 10; pl. 9, figs. 5-7, 1929. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 19, pl. 3, figs. 4-8, 1937.

M.U.G.D. No. 1613. Hypotype, source of Fossil Sections Nos. 117, 118.

M.U.G.D. No. 1616. Hypotype, source of Fossil Sections Nos. 146, 147.

M.U.G.D. Fossil Section Coll No. 117. Tectohypotype, tangential section, figured by Ripper, loc. cit., fig. 8, 1937, of hypotype No. 1613.

M.U.G.D. Fossil Section Coll. No. 118. Tectohypotype, vertical section, figured by Ripper, loc. cit., fig. 7, 1937, of hypotype No. 1613.

M.U.G.D. Fossil Section Coll. No. 146. Tectohypotype, tangential section, figured by Ripper, loc. cit., fig. 6, 1937, of hypotype No. 1616.

M.U.G.D. Fossil Section Coll. No. 147. Tectohypotype, vertical section, figured by Ripper, loc. cit., figs. 4 and 5, 1937, of hypotype No. 1616.

Middle Devonian.

Heath's Quarry, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field Nos. 129 = Reg. No. 1613, and 157 = Reg. No. 1616).

Clathrodictyon convictum Yavorsky var. **delicatula** Ripper, 1937.

Clathrodictyon convictum Yavorsky variety *delicatula* E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 20, pl. 4, figs. 1, 2, 29th December, 1937.

M.U.G.D. No. 1606. HOLOTYPE, source of Fossil Section No. 63.

M.U.G.D. Fossil Section Coll. No. 63. TECTOHOLOTYPE, vertical section, fig. 1, and tangential section, fig. 2, figured by Ripper, loc. cit., 1937, of holotype No. 1606 (given erroneously as No. 1660 by Ripper, loc. cit., 1937, in explanation of plate 4, fig. 1).

Middle Devonian.

Rocky Camp, Commonwealth Quarries, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 56).

Clathrodictyon regulare (von Rosen, 1867).

Stromatopora regularis F. von Rosen, Ueber die Natur der Stromatoporen, p. 74, pl. 9, figs. 1-4, 1867.

Clathrodictyon regulare Rosen sp.: H. A. Nicholson, Ann. Mag. Nat. Hist., [5] 19, p. 10, pl. 2, figs. 5, 6, 1887. H. A. Nicholson, Mon. Brit. Strom., pt. 2, Palaeontogr. Soc. Lond., 42, for 1888, p. 155, pl. 18, figs. 8-11a, 1889. P. E. Vinassa de Regny, Palaeontographia italica, 14, p. 182, pl. 21 (1), figs. 18-20, 1908. K. Boehnke, Palaeontographica, 61, p. 168, text-fig. 12, 1915. D. Le Maitre, Mém. Soc. Géol. du Nord, 12, p. 39; p. 185, pl. 12, figs. 1-6, 1934. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 2, pl. 1, figs. 1, 2, 1937. E. A. Ripper, *ibid.*, p. 16, pl. 3, figs. 1, 2, 1937.

M.U.G.D. No. 1599. HYPOTYPE, source of Fossil Sections Nos. 175, 176.

M.U.G.D. Fossil Section Coll. No. 175. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., pl. 1, fig. 1, 1937, of hypotype No. 1599.

M.U.G.D. Fossil Section Coll. No. 176. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., pl. 1, fig. 2, 1937, of hypotype No. 1599.

Lower Devonian.

Griffith's Quarry, Allot. 131, Loyola, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 97).

M.U.G.D. No. 1618. HYPOTYPE, source of Fossil Sections Nos. 156, 157.

M.U.G.D. Fossil Section Coll. No. 156. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., pl. 3, fig. 1, 1937, of hypotype No. 1618.

M.U.G.D. Fossil Section Coll. No. 157. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., pl. 3, fig. 2, 1937, of hypotype No. 1618.

Middle Devonian.

Heath's Quarry, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 168).

Hermatostroma episcopale Nicholson, 1892.

Hermatostroma episcopale H. A. Nicholson, Mon. Brit. Strom., pt. 4, Palaeontogr. Soc. Lond., 46, for 1892, p. 219, pl. 28, figs. 4-11, November, 1892. De Le Maitre, Mém. Soc. Géol. du Nord, 12, p. 198, pl. 15, figs. 5, 6; pl. 16, figs. 1, 2, 1934. E. A. Ripper, Proc. Roy. Soc. Vict., n.s., 50 (1), p. 29, pl. 5, figs. 7, 8, 1937.

M.U.G.D. No. 1612. HYPOTYPE, source of Fossil Sections Nos. 113, 114.

M.U.G.D. Fossil Section Coll. No. 113. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., fig. 8, 1937, of hypotype No. 1612.

M.U.G.D. Fossil Section Coll. No. 114. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., fig. 7, 1937, of hypotype No. 1612.

Middle Devonian.

Heath's Quarry, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 126).

Hermatostroma episcopale Nicholson var. **buchanensis** Ripper, 1937.

Hermatostroma episcopale H. A. Nicholson variety *buchanensis* E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 32, pl. 5, figs. 9, 10, 29th December, 1937.

M.U.G.D. No. 1602. SYNTYPE, source of Fossil Sections Nos. 20, 21.

M.U.G.D. No. 1603. SYNTYPE, source of Fossil Sections Nos. 27, 28.

M.U.G.D. Fossil Section Coll. No. 20. TECTOSYNTYPE, vertical section, figured by Ripper, loc. cit., fig. 9, 1937, of syntype No. 1602.

M.U.G.D. Fossil Section Coll. No. 21. Tangential section, unfigured, of syntype No. 1602.

M.U.G.D. Fossil Section Coll. No. 27. Vertical section, unfigured, of syntype No. 1603.

M.U.G.D. Fossil Section Coll. No. 28. TECTOSYNTYPE, tangential section, figured by Ripper, loc. cit., fig. 10, of syntype No. 1603.

Middle Devonian.

Near Hicks', Murrindal, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field Nos. 18 = Reg. No. 1602, and 23 = Reg. No. 1603).

Stromatopora concentrica Goldfuss, 1826.

Stromatopora concentrica G. A. Goldfuss, Petrefacta Germaniae, 1, p. 22, pl. 8, figs. 5a-c, 1826. H. A. Nicholson, Mon. Brit. Strom., pt. 1, Palaeontogr. Soc. Lond., 39, for 1885, p. 2; pl. 11, figs. 15-18, 1886. Waagen, W., and Wentzel, J., Palaeontologia Indica, series 13 (Salt-Range Fossils), 1 (7), p. 927, pl. 120, figs. 4a, b, 5a, b; pl. 121, figs. 1a-c, 1888. H. A. Nicholson, Mon. Brit. Strom., pt. 3, Palaeontogr. Soc. Lond., 44, for 1890, p. 164, pl. 20, fig. 10-12, pl. 21; figs. 1-3, pl. 24, figs. 9, 10, 1891. P. E. Vinassa de Regny, Boll. R. Com. geol. d'Ital. 41, p. 46, pl. 1, fig. 6, 1910. M. Gortoni, Riv. ital. di Paleont., 18, p. 123, pl. 4, figs. 6, 7, 1912. K. Boehnke, Palaeontographica, 61, p. 180, text-figs. 30, 31, 1915. P. E. Vinassa de Regny, Paleont. italica, 24, p. 113, pl. 11 (6), figs. 3-5, 1919. V. Riabinin, Bull. Unit. Geol. and Prospecting Service U.S.S.R., 51, pt. 58, p. 860, pl. 2, figs. 5, 6, 1932. D. Le Maitre, Mém. Soc. Géol. du Nord, 12, p. 197, pl. 13, figs. 6, 7, 1934. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 24, pl. 4, figs. 7, 8; pl. 5, figs. 1, 2, 1937.

M.U.G.D. No. 1608. HYPOTYPE, source of Fossil Sections Nos. 69, 70.

M.U.G.D. Fossil Section Coll. No. 69. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., fig. 8, 1937, of hypotype No. 1608.

M.U.G.D. Fossil Section Coll. No. 70. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., fig. 7, 1937, of hypotype No. 1608.

Middle Devonian.

Rocky Camp, Commonwealth Quarries, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 241).

M.U.G.D. No. 1615. HYPOTYPE, source of Fossil Sections Nos. 132, 133.

M.U.G.D. Fossil Section Coll. No. 132. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., fig. 2, 1937, of hypotype No. 1615.

M.U.G.D. Fossil Section Coll. No. 133. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., fig. 1, 1937, of hypotype No. 1615.

Middle Devonian.

Heath's Quarry, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 146).

Stromatopora concentrica Goldfuss var. **colliculata** Nicholson, 1886.

Stromatopora concentrica G. A. Goldfuss variety *colliculata* H. A. Nicholson, Mon. Brit. Strom., pt. 1, Palaeontogr. Soc. Lond., 39, for 1885, pl. 3, fig. 5, January, 1886. H. A. Nicholson, *idem.*, pt. 3, *ibid.*, 44, for 1890, p. 165, 1891. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 50 (1), p. 26, pl. 5, figs. 3, 4, 1937.

M.U.G.D. No. 1614. Hypotype, source of Fossil Sections Nos. 121, 122.

M.U.G.D. Fossil Section Coll. No. 121. Tectohypotype, vertical section, figured by Ripper, loc. cit., fig. 3, 1937, of hypotype No. 1614.

M.U.G.D. Fossil Section Coll. No. 122 Tectohypotype, tangential section, figured by Ripper, loc. cit., fig. 4, 1937, of hypotype No. 1614.

Middle Devonian.

Heath's Quarry, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 138).

Stromatopora foveolata (Girty, 1895).

Syringostroma foveolatum G. H. Girty, Ann. Rept. New York State Mus., 48 (2), for 1894, p. 295, pl. 6, figs. 8, 9, 1895.

Stromatopora foveolata (Girty): W. A. Parks, Univ. Toronto Studies, Geol. Series 6, p. 20, pl. 17, figs. 5-7; pl. 18, figs. 4, 10, 1909. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 49 (2), p. 185, text figs. 2A, B (p. 186), 1937.

M.U.G.D. No. 768. Hypotype, source of Fossil Sections Nos. 235, 236.

M.U.G.D. Fossil Section Coll. No. 235. Tectohypotype, vertical section, figured by Ripper, loc. cit., fig. 2A, 1937, of hypotype No. 768.

M.U.G.D. Fossil Section Coll. No. 236. Tectohypotype, tangential section, figured by Ripper, loc. cit., fig. 2B, 1937, of hypotype No. 768.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Stromatopora hüpschii (Bargatzky, 1881).

Caunopora hüpschii A. Bargatzky, Die Stromatoporen des rheinischen Devons, p. 62, 1881.

Stromatopora hüpschii Bargatzky sp.; H. A. Nicholson, Mon. Brit. Strom., pt. 1, Palaeontogr. Soc. Lond., 39, for 1885, figs. 6a, b (p. 50); pl. 10, figs. 8, 9, 1886. H. A. Nicholson, *idem*, pt. 3, *ibid.*, 44, for 1890, p. 176, fig. 20a, b, (p. 177); pl. 22, figs. 3-7, 1891. P. E. Vinassa de Regny, Palaeontographia italica, 24, p. 113, pl. 12 (7), figs. 5, 6, 1919.

Stromatopora aff. *hüpschii* (Bargatzky): E. A. Ripper, *Proc. Roy. Soc. Vic.*, n.s., 49 (2), p. 186, pl. 8, figs. 7, 8, 1937.

Stromatopora hüpschii (Bargatzky): E. A. Ripper, *ibid.*, 50 (1), p. 26, pl. 5, figs. 5, 6, 1937.

M.U.G.D. No. 1601. Hypotype, source of Fossil Sections Nos. 3, 4.

M.U.G.D. Fossil Section Coll. No. 3. Tectohypotype, vertical section, figured by Ripper, loc. cit., fig. 5, 1937, of hypotype No. 1601.

M.U.G.D. Fossil Section Coll. No. 4. Tectohypotype, tangential section, figured by Ripper, loc. cit., fig. 6, 1937, of hypotype No. 1601.

Middle Devonian.

Citadel Rocks, Murrindal River, Buchan, Victoria.

Coll. Miss E. A. Ripper, 1933 (Field No. 1).

Stromatoporella granulata (Nicholson, 1873).

Stromatopora granulata H. A. Nicholson, Ann. Mag. Nat. Hist., [4] 12, p. 94, pl. 4, figs. 3, 3*a*, 1873. H. A. Nicholson, ibid., [5] 18, p. 10, 1886.

Stromatoporella granulata H. A. Nicholson, Mon. Brit. Strom., pt. 1, Palaeontogr. Soc. Lond., 39, for 1885, pl. 1, figs. 4, 5; pl. 4, fig. 6; pl. 7, figs. 5, 6, 1886. H. A. Nicholson, *idem*, pt. 3, *ibid.*, 44, for 1890, p. 202, 1891. H. A. Nicholson, *idem*, pt. 4, *ibid.*, 46, for 1892, p. 203, pl. 26, figs. 1, 1*a*, *b*, 1892. W. A. Parks, Univ. Toronto Studies, Geol. Ser., 39, p. 95, pl. 15, figs. 6, 7; pl. 16, figs. 1-7, 1936. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 49 (2), p. 191, pl. 9, figs. 3-5, 1937.

M.U.G.D. No. 1622. HYPOTYPE, source of Fossil Sections Nos. 200, 201.

M.U.G.D. Fossil Section Coll. No. 200. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., fig. 5, 1937, of hypotype No. 1622.

M.U.G.D. Fossil Section Coll. No. 201. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., figs. 3, 4, 1937, of hypotype No. 1622.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Coll. Miss E. A. Ripper.

Syringostroma densum Nicholson, 1875.

Syringostroma densa H. A. Nicholson, Rept. Geol. Surv. Ohio, 2 (2), *Palaeontology*, p. 251, pl. 24, figs. 2, 2*a*, *b*, 1875.

Syringostroma densum H. A. Nicholson, Mon. Brit. Strom., pt. 1, Palaeontogr. Soc. Lond., 39, for 1885, p. 97, pl. 11, figs. 13, 14, 1886. H. A. Nicholson, Ann. Mag. Nat. Hist., [6] 7, p. 326, pl. 10, figs. 8, 9, 1891. E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 49 (2), p. 182, pl. 8, figs. 3-5, 1937.

M.U.G.D. No. 1620. Hypotype, source of Fossil Sections Nos. 225, 226.

M.U.G.D. Fossil Section Coll. No. 225. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., figs. 4, 5, 1937, of hypotype No. 1620.

M.U.G.D. Fossil Section Coll. No. 226. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., fig. 3, 1937, of hypotype No. 1620.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Coll. A. C. Frostick and pres. 19.8.36.

Syringostroma aff. ristigouchense (Spencer, 1884).

Coenostroma ristigouchense Spencer, Bull. Mus. Univ. Missouri, p. 49, pl. 6, figs. 12, 12*a*, 1884.

Syringostroma ristigouchense Spencer sp.: H. A. Nicholson, Mon. Brit. Strom., pt. 1, Palaeontogr. Soc. Lond., 39, for 1885, p. 97, pl. 11, figs. 11, 12, 1886. H. A. Nicholson, Ann. Mag. Nat. Hist., [6] 7, p. 324, pl. 8, figs. 6-8, 1891. W. A. Parks, Univ. Toronto Studies, Geol. Ser., 6, p. 10, pl. 16, figs. 3-5, 1909.

Syringostroma aff. *ristigouchense* (Spencer); E. A. Ripper, Proc. Roy. Soc. Vic., n.s., 49 (2), p. 181, pl. 8, figs. 1, 2, 1937.

M.U.G.D. No. 1619. HYPOTYPE, source of Fossil Sections Nos. 208, 209.

M.U.G.D. Fossil Section Coll. No. 208. TECTOHYPOTYPE, tangential section, figured by Ripper, loc. cit., fig. 2, 1937, of hypotype No. 1619.

M.U.G.D. Fossil Section Coll. No. 209. TECTOHYPOTYPE, vertical section, figured by Ripper, loc. cit., fig. 1, 1937, of hypotype No. 1619.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

A piece cut from a specimen in the collection of F. S. Colliver, Melbourne

CALYPTOBLASTEA.

Archaeocryptolaria recta Chapman, 1919.

Archaeocryptolaria recta F. Chapman, Proc. Roy. Soc. Vic., n.s., 31 (1), p. 392, pl. 19, figs. 4, 4*a*; pl. 20, fig. 8, May, 1919. F. Chapman and D. E. Thomas, *ibid.*, 48 (2), p. 198, pl. 14, fig. 1, June, 1936.

M.U.G.D. No. 527. COUNTERPART OF HOLOTYPE in National Museum, Melbourne (No. 13111), figured by Chapman, loc. cit., 1919, and by Chapman and Thomas, loc. cit., 1936.

Middle Cambrian.

Deep Creek, 2 miles ENE. of North Monegetta, Victoria.

Coll. Prof. E. W. Skeats.

Obs.—The holotype in the National Museum is Reg. No. 13111, not 1311 as stated by Chapman and Thomas.

Archaeolafoea monegettae (Chapman, 1919).

See *Mastigograptus monegettae* Chapman, 1919.

Archaeolafoea serialis Chapman and Thomas, 1936.

Archaeolafoea serialis F. Chapman and D. E. Thomas, Proc. Roy. Soc. Vic., n.s., 48 (2), p. 201, pl. 14, figs. 9-11; pl. 15, figs. 12, 12*a*, 12*b*, June, 1936.

M.U.G.D. No. 1591. PARATYPE, figured by Chapman and Thomas, loc. cit., pl. 15, figs. 12, 12*a*, 12*b*, 1936.

M.U.G.D. No. 1592. COUNTERPART OF PARATYPE No. 1591.

Middle Cambrian.

Deep Creek, 2 miles E.N.E. of North Monegetta, Victoria.

Coll. G. Baker, 29.4.33.

Cactograptus flexispinosus Chapman and Thomas, 1936.

Cactograptus flexispinosus F. Chapman and D. E. Thomas, Proc. Roy. Soc. Vic., n.s., 48 (2), p. 207, pl. 17, figs. 29-33, June, 1936.

M.U.G.D. No. 1593. PARATYPE, figured by Chapman and Thomas, loc. cit., pl. 17, fig. 33, 1936.

M.U.G.D. No. 1594. COUNTERPART OF PARATYPE No. 1593.

Middle Cambrian.

Deep Creek, 2 miles E.N.E. of North Monegetta, Victoria.

Coll. E. S. Hills, 29.4.33.

Mastigograptus monegettae Chapman, 1919;—**Archaeolafoea monegettae** (Chapman, 1919).

Mastigograptus monegettae F. Chapman, Proc. Roy. Soc. Vic., n.s., 31 (1), p. 391, pl. 19, figs. 2, 2*a*; pl. 20, fig. 6, May, 1919.

Archaeolafoea monegettae Chapman: F. Chapman and D. E. Thomas, *ibid.*, 48 (2), p. 200, pl. 14, figs. 6-8, June, 1936.

M.U.G.D. No. 528. COUNTERPART OF HOLOTYPE in National Museum, Melbourne (No. 13113), figured by Chapman, loc. cit., 1919.

Middle Cambrian.

Deep Creek, 2 miles E.N.E. of North Monegetta, Victoria.

Coll. Prof. E. W. Skeats.

GRAPTOLITOIDEA.

Climacograptus riddellensis Harris, 1924.

Diplograpsus rectangularis McCoy: F. McCoy, Prodromus Palaeont. Vic., decade 1, p. 11, pl. 11, figs. 7, 7*a*, 1874. Not *Diplograpsis* [sic] *rectangularis* M'Coy, Ann. Mag. Nat. Hist., [2] 6 (34), p. 271, 1850 [= *Climacograptus rectangularis* (McCoy)].

Climacograptus riddellensis W. J. Harris, Proc. Roy. Soc. Vic., n.s., 36 (2), p. 100, pl. 8, figs. 11, 12, August, 1924.

M.U.G.D. No. 647. COUNTERPART OF HOLOTYPE in National Museum, Melbourne, figured by Harris, loc. cit., fig. 11, 1924.

Upper Ordovician (Gisbornian).

Geol. Surv. Vic. Locality Ba 67, junction of Jackson's and Riddell's Creeks, about 3 miles south-east of Riddell railway station, Victoria.

Pres. W. J. Harris, 14.12.23.

Clonograptus flexilis (J. Hall, 1858).

Graptolithus flexilis J. Hall, Geol. Surv. Canada, Report for 1857, p. 119, 1858. J. Hall, Graptolites of the Quebec Group, Geol. Surv. Canada, decade 2, p. 103, pl. 10, figs. 3-9, 1865.

Clonograptus flexilis J. Hall: T. S. Hall, Proc. Roy. Soc. Vic., n.s., 11 (2), pl. 19, fig. 20, February, 1899. W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 1 (3), pl. 1 (p. 69), fig. 6, July, 1938.

M.U.G.D. No. 1661. HYPOTYPE, figured by T. S. Hall, loc. cit., 1899, and copied by Harris and Thomas, loc. cit., 1938.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Clonograptus magnificus (Pritchard, 1892).

See *Temnograptus magnificus* Pritchard, 1892.

Clonograptus rigidus (J. Hall, 1858).

Graptolithus rigidus J. Hall, Geol. Surv. Canada, Report for 1857, p. 121, 1858. J. Hall, Graptolites of the Quebec Group, Geol. Surv. Canada, decade 2, p. 105, pl. 11, figs. 1-5, 1865.

Clonograptus rigidus J. Hall: T. S. Hall, Proc. Roy. Soc. Vic., n.s., 11 (2), pl. 19, fig. 21, February, 1899. W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 1 (3), pl. 1 (p. 69), fig. 5, July, 1938.

M.U.G.D. No. 1660. HYPOTYPE, figured by T. S. Hall, loc. cit., 1899, and copied by Harris and Thomas, loc. cit., 1938.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Obs.—The specimen now lacks the uppermost part of T. S. Hall's figure, of which it is, however, undoubtedly the original, and is so marked in T. S. Hall's handwriting.

Dichograptus expansus Harris and Thomas, 1940.

Dichograptus expansus W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 2 (2), p. 130, pl. 1 (p. 134), fig. 5; pl. 2 (p. 135), figs. 6*a*, 6*b*, January, 1940.

M.U.G.D. No. 1678. COUNTERPART OF PARATYPE in Geol. Mus. Mines Dept. Vic. (No. 42560), figured by Harris and Thomas, loc. cit., pl. 2, fig. 6*b*, 1940.

Lower Ordovician (Bendigonian, Zone Be 2).

North-west corner of Allot. 30A, Sect. II., Parish of Campbelltown, Victoria.

Coll. Thos. Smith, and pres. D. E. Thomas, 1939.

Dichograptus octonarius (J. Hall, 1858).

Graptolithus octonarius J. Hall, Geol. Surv. Canada, Report for 1857, p. 124, 1858. J. Hall, Graptolites of the Quebec Group, Geol. Surv. Canada, decade 2, p. 95, pl. 10, figs. 1, 2, 1865.

Dichograptus octonarius (J. Hall): W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 2 (2), p. 129, pl. 1 (p. 134), figs. 2a, 2b; pl. 2 (p. 135), fig. 3, January, 1940.

M.U.G.D. No. 1679. COUNTERPART OF HYPOTYPE in Geol. Mus. Mines Dept. Vic. (No. 42553), figured by Harris and Thomas, loc. cit., pl. 1, fig. 2a; pl. 2, fig. 3, 1940.

Lower Ordovician (Castlemainian, Zone Ca 2).

Victoria Gully, Castlemaine, Victoria.

Pres. D. E. Thomas, 1939.

Dichograptus octonarius (J. Hall) var. **solida**, Harris and Thomas, 1940.

Dichograptus octonarius var. *solida* W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 2 (2), p. 130, pl. 1, fig. 3; pl. 2, fig. 4, January, 1940.

M.U.G.D. No. 1680. COUNTERPART OF HOLOTYPE of variety in Geol. Mus. Mines Dept. Vic. (No. 42555), figured by Harris and Thomas, loc. cit., 1940.

Lower Ordovician (Yapeenian, Zone Ya 2).

Wiley's Quarry, Woodend, Victoria.

Pres. D. E. Thomas, 1939.

Dictyonema grande T. S. Hall, 1892.

See *Dictyonema macgillivrayi* T. S. Hall, 1897.

Dictyonema macgillivrayi T. S. Hall, 1897.

Dictyonema grande T. S. Hall, Proc. Roy. Soc. Vic., n.s., 4 (1), p. 8, pls. 1, 2, April, 1892. G. B. Pritchard, *ibid.*, 7, p. 28, January, 1895. Not *Dictyonema grandis* H. A. Nicholson, Ann. Mag. Nat. Hist., (4) 11 (62), p. 134, text figs. 1a, 1b (p. 135), 1873.

Dictyonema macgillivrayi T. S. Hall, nom. mut., Proc. Roy. Soc. Vic., n.s., 10 (1), p. 15, July, 1897. T. S. Hall, *ibid.*, 11 (2), p. 174, pl. 18, fig. 27, February, 1899. W. J. Harris and R. A. Keble, *ibid.*, 44 (1), p. 47, pl. 3, February, 1932.

M.U.G.D. No. 1664. HYPOTYPE, figured (in part) by T. S. Hall, loc. cit., 1899, and counterpart of hypotype in National Museum, Melbourne (No. 13126), figured by Harris and Keble, loc. cit., 1932. It is also the basis of the description by Pritchard, loc. cit., 1895.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Dictyonema pulchellum T. S. Hall, 1899.

Dictyonema pulchellum T. S. Hall, Proc. Roy. Soc. Vic., n.s., 11 (2), p. 174, pl. 18, figs. 28-30, February, 1899.

M.U.G.D. No. 1656. SYNTYPE, figured by T. S. Hall, loc. cit., pl. 18, fig. 28, 1899.

M.U.G.D. No. 1657. SYNTYPE, figured by T. S. Hall, loc. cit., pl. 18, figs. 29, 30, 1899.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Didymograptus ensjoensis Monsen, 1937.

Didymograptus ensjoensis A. Monsen, Sond. aus. Norsk. Geol. Tidssk., 16, pl. 1, fig. 40; pl. 7, figs. 12, 14, 1937. W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 2 (2), p. 133, pl. 1, figs. 13*a*, 13*b*; pl. 2, figs. 15*a*, 15*b*, January, 1940.

M.U.G.D. No. 1681. Counterpart of hypotype in Geol. Mus. Mines Dept. Vic. (No. 43206), figured by Harris and Thomas, loc. cit., pl. 1, fig. 13*a*; pl. 2, fig. 15*a*, *b*, 1940.

Lower Ordovician (Bendigonian, Zone Be 2).

North-west corner of Allot. 30A, Sect. II., Parish of Campbelltown, Victoria.

Coll. Thos. Smith, and pres. D. E. Thomas, 1939.

Didymograptus taylori T. S. Hall, 1899.

Didymograptus taylori T. S. Hall, Proc. Roy. Soc. Vic., n.s., 11 (2), p. 167, pl. 17, figs. 11, 12, February, 1899.

M.U.G.D. No. 1658. Holotype, figured by T. S. Hall, loc. cit., 1899.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Goniograptus (?)velatus Harris and Thomas, 1939.

Goniograptus velatus W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 2 (1), p. 57, text figs. 8, 9, July, 1939.

M.U.G.D. No. 1097. Paratype, figured by Harris and Thomas, loc. cit., text fig. 9, 1939.

Lower Ordovician (Bendigonian, Zone Be 3) .

East side of Jim Crow Creek, 100 yards north of Tipperary Spring, Daylesford, Victoria.

Coll. J. O'M. Lyons and pres. 10.11.30.

Monograptus crinitus Wood, 1900.

Monograptus crinitus E. M. R. Wood, Quart. Journ. Geol. Soc. London, 56 (2), p. 480, text figs. 23*a*-*d* (p. 481), pl. 25, figs. 26*a*, 26*b*, May, 1900. G. L. Elles and E. M. R. Wood, British Graptolites, pt. 9, Mon. Pal. Soc., 66, p. 435, text figs. 298*a*-*c*, pl. 44, figs. 3*a*-*c*, February, 1913. W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 1 (1), p. 74, pl. 2, fig. 31, July, 1937.

M.U.G.D. No. 1596. Counterpart of hypotype No. 1597.

M.U.G.D. No. 1597. Hypotype, figured by Harris and Thomas, loc. cit., 1937.

Upper Silurian (Melbournian).

Track to pumping station, Studley Park, Melbourne, Victoria.

Coll. E. S. Hills and pres. 1936.

Monograptus turriculatus (Barrande, 1850).

Graptolithus turriculatus Barrande, Grapt. de Bohême, p. 56, pl. 4, figs. 7-11, 1850.

Monograptus turriculatus (Barrande): G. L. Elles and E. M. R. Wood, British Graptolites, pt. 9, Mon. Pal. Soc., 66, p. 438, text figs. 301*a*-*c*, pl. 44, figs. 4*a*-*e*, February, 1913. T. S. Hall, Proc. Roy. Soc. Vic., n.s., 27 (1), p. 114, pl. 17, figs. 18, 19, September, 1914.

M.U.G.D. No. 539. Counterpart of hypotype No. 540.

M.U.G.D. No. 540. Hypotype, figured by T. S. Hall, loc. cit., 1914.

Lower Silurian (Keilorian).

Aplin's section, the Monocline, Keilor, Victoria.

Coll. Prof. E. W. Skeats.

Monograptus uncinatus Tullberg var. **orbatus** Wood, 1900.

Monograptus uncinatus variety *orbatus* E. M. R. Wood, Quart. Journ. Geol. Soc. London, 56 (3), p. 476, text figs. 20*a*, 20*b*, pl. 25, figs. 23*a*, 23*b*, May, 1900. G. L. Elles and E. M. R. Wood, British Graptolites, pt. 9, Mon. Pal. Soc., 66, p. 427, text figs. 290*a*, 290*b* (p. 428), pl. 43, figs. 1*a-d*, February, 1913. W. H. Lang and I. C. Cookson, Phil. Trans. Roy. Soc. London, Ser. B. No. 517, vol. 224, p. 422 (citation), March, 1935. W. J. Harris and D. E. Thomas, Min. and Geol. Journ., Vic., 1 (1), p. 73, pl. 2, figs. 23-29, July, 1937.

M.U.G.D., No. 1572. Hypotype, figured by Harris and Thomas, loc. cit., fig. 23, 1937.

M.U.G.D. No. 1575. Counterpart of hypotype No. 1572.

Upper Silurian (Zone of *Monograptus nilssoni*).

Geol. Surv. Vic. Loc. 9, Railway Cutting, between 2¼ and 2½ miles from Alexandra, Victoria.

Obs.—This is on the slab the graptolites of which were identified by Dr. G. L. Elles in 1934 and cited by Lang and Cookson, loc. cit., 1935. The locality was erroneously cited by Harris and Thomas, loc. cit., 1937, as "19-mile Quarry, Yarra Track." (*Fide* these authors, op. cit, 2 (5), p. 305 and footnote, 1941.)

Temnograptus magnificus Pritchard, 1892:—**Clonograptus magnificus** (Pritchard, 1892).

Temnograptus magnificus G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 4 (1), p. 56, pl. 6, figs. 1-3, April, 1892. Pritchard, *ibid.*, 7, p. 29, January, 1895.

Clonograptus magnificus Pritchard: T. S. Hall, *ibid.*, 11 (2), p. 170, February, 1899.

M.U.G.D. No. 1665. Holotype, figured by Pritchard, loc. cit., 1892.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Obs.—The type specimen, measuring about one metre in diameter, is probably the largest known Victorian graptolite.

Tetragraptus decipiens T. S. Hall, 1899.

Tetragraptus decipiens T. S. Hall, Proc. Roy. Soc. Vic., n.s., 11 (2), p. 168, pl. 17, figs. 13-15; pl. 18, figs. 16-19, February, 1899. R. A. Keble, Rec Geol. Surv. Vic., 4 (2), p. 199, pl. 34, 1920.

M.U.G.D. No. 1663. Paratype, figured by T. S. Hall, loc. cit., pl. 18, fig. 16, 1899.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Obs.—This specimen, though referred to the above species by Hall (loc. cit., p. 178), bears six stipes and thus should be excluded from *Tetragraptus*. An accompanying specimen with five stipes (No. 1662) purchased from Dr. Pritchard, and from the same locality, was labelled "figd. T.S.H.", but apparently it was never figured by Dr. T. S. Hall.

ANTHOZOA.

Acanthophyllum mansfieldense (Dun, 1898).

Cyathophyllum mansfieldense W. S. Dun, Proc. Roy. Soc. Vic., n.s., 10 (2), p. 87, pl. 3, figs. 3, 4, May, 1898.

Acanthophyllum mansfieldense (Dun): D. Hill, *ibid.*, 51 (2), p. 223, pl. 15, figs. 1-3, July, 1939.

M.U.G.D. No. 1646. Hypotype, source of Fossil Section No. 610.

M.U.G.D. No. 1653. Hypotype, source of Fossil Sections Nos. 608, 609.

M.U.G.D. Fossil Section Coll. No. 608. Tectohypotype, transverse section, figured by D. Hill, loc. cit., figs. 1*a*, 1*b*, 1939, of hypotype No. 1653.

M.U.G.D. Fossil Section Coll. No. 609. Tectohypotype, vertical section, figured by D. Hill, loc. cit., fig. 2, 1939, of hypotype No. 1653.

M.U.G.D. Fossil Section Coll. No. 610. Tectohypotype, transverse section, figured by D. Hill, loc. cit., fig. 3, 1939, of hypotype No. 1646.

This and the preceding are the basis of the description by Dr. D. Hill, loc. cit., p. 223, 1939.

Lower Devonian.

Quarry, Allot. 94, Parish of Loyola, Victoria.

Coll. Miss E. A. Ripper and pres. 27.6.33.

Acervularia chalkii Chapman, 1931:—**Prismatophyllum chalkii** (Chapman, 1931).

Acervularia chalkii F. Chapman, Vic. Naturalist, 48 (5), p. 94, text fig., September, 1931.

Prismatophyllum chalkii (Chapman): D. Hill, Proc. Roy. Soc. Vic., n.s., 51 (2), p. 232, pl. 13, figs. 1-5, July, 1939.

M.U.G.D. No. 1877. Holotype, figured by Chapman, *loc. cit.*, 1931, and by Hill, loc. cit., fig. 1, 1939.

Coll. A. S. Chalk, and pres. W. D. Chapman, 23.10.44.

M.U.G.D. No. 1654. Hypotype, formerly Univ. Qld. Geol. Dept. No. F3252, and source of Fossil Sections Nos. 626, 627.

M.U.G.D. No. 1655. Hypotype, formerly Univ. Qld. Geol. Dept. No. F3253, and source of Fossil Sections Nos. 628, 629. This and the preceding are referred to by D. Hill, loc. cit., p. 233, 1939.

M.U.G.D. Fossil Section Coll. No. 626. Tectohypotype, transverse section, figured by D. Hill, loc. cit., fig. 2, 1939, of hypotype No. 1654.

M.U.G.D. Fossil Section Coll. No. 627. Tectohypotype, vertical section, figured by D. Hill, loc. cit., fig. 5, 1939, of hypotype No. 1654.

M.U.G.D. Fossil Section Coll. No. 628. Tectohypotype, oblique section, figured by D. Hill, loc. cit., fig. 3, 1939, of hypotype No. 1655.

M.U.G.D. Fossil Section Coll. No. 629. Tectohypotype, oblique section, figured by D. Hill, loc. cit., fig. 4, 1939, of hypotype No. 1655.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Coll. Dr. D. Hill and pres. 19.4.39.

Columnaria (Loyolophyllum) cresswelli Chapman, 1914.

See *Loyolophyllum cresswelli* Chapman, 1914.

Cyathophyllum cresswelli Chapman, 1925.

See *Mictophyllum cresswelli* (Chapman, 1925).

Cyathophyllum elegantulum Dun, 1898.

See *Trapezophyllum elegantulum* (Dun, 1898).

Cyathophyllum mansfieldense Dun, 1898.

See *Acanthophyllum mansfieldense* (Dun, 1989).

Cyathophyllum subcaespitosum Chapman, 1925.

See *Lyrielasma subcaespitosum* (Chapman, 1925).

" **Cystiphyllum** " sp.

"*Cystiphyllum*" sp.: D. Hill, Proc. Roy. Soc. Vic., n.s., 51 (2), p. 250, pl. 15, figs. 4, 5, 1939.

M.U.G.D. No. 1652. FIGURED SPECIMEN, source of Fossil Section No. 620.

M.U.G.D. Fossil Section Coll. No. 620. FIGURED SPECIMEN, transverse section (fig. 4), and vertical section (fig. 5), figured by Hill, loc. cit., 1939, of specimen No. 1652. Dr. Hill refers to the originals of figs. 4 and 5 as Nos. 620A and 620B, respectively, but both are on the one slide, numbered 620.

Lower Devonian.

"Loyola" (Hill, loc. cit., p. 250, 1939) = Quarry, Allot. 94, Parish of Loyola, Victoria.

Coll. Miss E. A. Ripper, and pres. 27.6.33.

Loyolophyllum cresswelli (Chapman, 1914).

Columnaria (Loyolophyllum) cresswelli F. Chapman, Rec. Geol. Surv. Vic., 3 (3), p. 306, pl. 51, figs. 15, 16; pl. 52, figs. 17, 18, 1914.

Loyolophyllum cresswelli Chapman: R. Etheridge, jun., Rec. Aust. Mus., 12, p. 51, 1918. D. Hill, Proc. Roy. Soc. Vic., n.s., 51 (2), p. 242, pl. 15, figs. 8-11, 1939.

M.U.G.D. No. 1644. HYPOTYPE, source of Fossil Section No. 616.

M.U.G.D. No. 1650. HYPOTYPE, source of Fossil Section No. 618.

M.U.G.D. No. 1651. HYPOTYPE, source of Fossil Section No. 617.

M.U.G.D. Fossil Section Coll. No. 616. TECTOHYPOTYPE, transverse section, figured by Hill, loc. cit., fig. 8, 1939, of hypotype No. 1644.

M.U.G.D. Fossil Section Coll. No. 617. TECTOHYPOTYPE, oblique section, figured by Hill, loc. cit., fig. 9, 1939, of hypotype No. 1651.

M.U.G.D. Fossil Section Coll. No. 618. TECTOHYPOTYPE, vertical section, figured by Hill, loc. cit., fig. 10, 1939, of hypotype No. 1650.

M.U.G.D. Fossil Section Coll. No. 619. TECTOHYPOTYPE, transverse section, figured by Hill, loc. cit., fig. 11, 1939, source unknown.

Lower Devonian.

Griffith's Quarry, Loyola, Victoria.

Coll. Miss E. A. Ripper, and pres. 27.6.33.

Lyrielasma subcaespitosum (Chapman, 1925).

Cyathophyllum subcaespitosum F. Chapman, Proc. Roy. Soc. Vic., n.s., 37 (1), p. 112, pl. 13, figs. 15, 16*a*, *b*, 25th May, 1925.

Lyrielasma subcaespitosum (Chapman): D. Hill, *ibid.*, 51 (2), p. 244, pl. 14, figs. 1-6; pl. 15, figs. 6, 7, 1939.

M.U.G.D. Fossil Section Coll. No. 621. TECTOHYPOTYPE, transverse section, figured by Hill, loc. cit., pl. 15, fig. 6, 1939.

M.U.G.D. Fossil Section Coll. No. 622. TECTOHYPOTYPE, transverse section, figured by Hill, loc. cit., pl. 15, fig. 7, 1939. The original specimen was destroyed in the making of the above slides.

Lower Devonian.

Griffith's Quarry, Loyola, Victoria.

Coll. Miss E. A. Ripper, and pres. 27.6.33.

Mictophyllum cresswelli (Chapman, 1925).

Cyathophyllum cresswelli F. Chapman, Proc. Roy. Soc. Vic., n.s., 37 (1), p. 111, pl. 13, figs. 11-14, May, 1925.

Mictophyllum cresswelli (Chapman): D. Hill, *ibid.*, 51 (2), p. 246, pl. 14, figs. 7-11, July, 1939.

M.U.G.D. Fossil Section Coll. No. 630. TECTOHYPOTYPE, vertical section, figured by D. Hill, loc. cit., fig. 9, 1939, of Univ. Qld. Geol. Dept. No. F3289.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Coll. Dr. D. Hill and pres. 19.4.39.

Phillipsastraea speciosa Chapman, 1914.

Phillipsastraea speciosa F. Chapman, Rec. Geol. Surv. Vic., 3 (3), p. 306, pl. 49, figs. 10, 11; pl. 50, figs. 12-14, 1914. D. Hill, Proc. Roy. Soc. Vic., n.s., 51 (2), p. 237, pl. 16, figs. 1-4, 1939.

M.U.G.D No. 1648. HYPOTYPE, source of Fossil Section No. 612.

M.U.G.D. No. 1649. HYPOTYPE, source of Fossil Section No. 611.

M.U.G.D. Fossil Section Coll. No. 611. TECTOHYPOTYPE, transverse and part of a vertical section, figured by Hill, loc. cit., fig. 3, 1939, of hypotype No. 1649.

M.U.G.D. Fossil Section Coll. No. 612. TECTOHYPOTYPE, vertical section, figured by Hill, loc. cit., fig. 4, 1939, of hypotype No. 1648.

Lower Devonian.

Loyola, Victoria.

Coll. Miss E. A. Ripper, and pres. 27.6.33.

Pleurodictyum megastomum Dun, 1898.

Pleurodictyum problematicum Goldfuss?: A. F. Foerste, Bull. Sci. Lab. Denison Univ., 3 (2), p. 132, pl. 13, fig. 22, 1888. Not *Pleurodictyum problematicum* G. A. Goldfuss, Petref. Germ., 1 (2), p. 113, pl. 43, figs. 18*a-g*, 1829.

Pleurodictyum, sp. (?*P. megastomum*, McCoy, MS.): W. S. Dun, Proc. Roy. Soc. Vic., n.s., 10 (2), p. 83, pl. 3, fig. 1, May, 1898.

Pleurodictyum megastomum Dun: F. Chapman, *ibid.*, 15 (2), p. 105, pl. 16, figs. 2-5, 1903. F. Chapman, *ibid.*, 33, p. 216, pl. 9, figs. 4-6, 1921. R. S. Allan, Trans. N.Z. Inst., 60 (2), p. 322, 1929. R. B. Withers, Proc. Roy. Soc. Vic., n.s., 44 (1), p. 15, text figs. 1-6, 1932. J. Shirley, Quart. Journ. Geol. Soc. Lond., 94 (4), p. 463, pl. 40, figs. 5-6, 1938. E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 35, pl. 4, figs. 1, 3, 4, 6, 9, 1942.

M.U.G.D. No. 1711. HYPOTYPE, mould of corallites, figured by Gill, loc. cit., fig. 1, 1942.

M.U.G.D. No. 1712. HYPOTYPE, epitheca on *Spirifer*, counterpart of No. 1711, figured by Gill, loc. cit., fig. 3, 1942.

Lower Devonian (Yeringian).

North of Lilydale, Victoria. E. D. Gill's Locality No. 3 (Proc. Roy. Soc. Vic., n.s., 52 (2), pp. 252, 258, 1940).

Pres. Rev. E. D. Gill, 24.5.41.

M.U.G.D. No. 1713. HYPOTYPE, mould of corallites, nineteen-celled form, figured by Gill, loc. cit., fig. 4, 1942.

M.U.G.D. No. 1714. HYPOTYPE, three-celled form, figured by Gill, loc. cit, fig. 6, 1942.

Lower Devonian (Yeringian).

Syme's Tunnel, Killara, Victoria.

Pres. Rev. E. D. Gill, 24.5.41.

Prismatophyllum chalkii (Chapman, 1931).

See *Acervularia chalkii* Chapman, 1931.

Prismatophyllum stevensi (Chapman, 1925).

See *Spongophyllum stevensi* Chapman, 1925.

Rugose Coral, gen. et. sp. indet.

Gen. et sp. indet.: D. Hill, Proc. Roy. Soc. Vic., n.s., 51 (2), p. 256, pl. 15, fig. 12, 1939.

M.U.G.D. Fossil Section Coll. No. 623. FIGURED SPECIMEN, oblique section, figured by Hill, loc. cit., 1939. The original specimen was destroyed in the process of making the slide.

Lower Devonian.

Loyola, Victoria.

Coll. Miss E. A. Ripper, and pres. 27.6.33.

Spongophyllum stevensi Chapman, 1925:—**Prismatophyllum stevensi** (Chapman, 1925).

Spongophyllum stevensi F. Chapman, Proc. Roy. Soc. Vic., n.s., 37 (1), p. 113, pl. 14, figs. 17*a*, 17*b*; pl. 15, figs. 24, 27, May, 1925. O. A. Jones, Proc. Roy. Soc. Qld., 44, p. 52, March, 1933.

Prismatophyllum stevensi (Chapman): D. Hill, Proc. Roy. Soc. Vic., n.s., 51 (2), p. 231, pl. 13, figs. 6, 7, July, 1939.

M.U.G.D. No. 797. PORTION OF HOLOTYPE in National Museum, Melbourne (No. 13305), figured by Chapman, loc. cit., 1925.

M.U.G.D. No. 797A. Polished piece cut from No. 797.

M.U.G.D. No. 797B. Transverse slice cut from holotype.

M.U.G.D. Fossil Section Coll. No. 624. TECTOHYPOTYPE, vertical section of holotype, cut from No. 797A, and figured by D. Hill, loc. cit., fig. 6, 1939.

M.U.G.D. Fossil Section Coll. No. 625. TECTOHYPOTYPE, transverse section of holotype, cut from No. 797A, and figured by D. Hill, loc. cit., fig. 7, 1939.

Lower Devonian (Yeringian).

Mitchell's Quarry, Cave Hill, Lilydale, Victoria.

Pres. L. E. Stevens, 8.8.21.

Trapezophyllum elegantulum (Dun, 1898).

Cyathophyllum elegantulum W. S. Dun, Proc. Roy. Soc. Vic., n.s., 10 (2), p. 85, pl. 3, figs. 5, 6, May, 1898.

Cyathophyllum? elegantulum Dun: R. Etheridge, jun., Prog. Rept. Geol. Surv. Vic., 11, p. 31, pl. B, figs. 2-4. 1899.

Cyathophyllum (Trapezophyllum) elegantulum Dun: R. Etheridge, jun., *ibid.*, p. 32, 1899.

Trapezophyllum elegantulum (Dun): D. Hill, Proc. Roy. Soc. Vic., n.s., 51 (2), p. 235, pl. 16, figs. 9-11, 1939.

M.U.G.D. No. 1647. Hypotype, source of Fossil Sections Nos. 613, 614.

M.U.G.D. Fossil Section Coll. No. 613. Tectohypotype, transverse section, figured by Hill, loc. cit., fig. 9, 1939, of hypotype No. 1647.

M.U.G.D. Fossil Section Coll. No. 614. Tectohypotype, vertical section, figured by Hill, loc. cit., fig. 10, 1939, of hypotype No. 1647.

M.U.G.D. Fossil Section Coll. No. 615. Tectohypotype, vertical section, figured by Hill, loc. cit., fig. 11, 1939. No specimen is known from which this slide was prepared.

Lower Devonian.

Loyola, Victoria.

Coll. Miss E. A. Ripper, and pres. 27.6.33.

ASTEROIDEA.

Eospondylus tenuis Withers and Keble, 1934.

Eospondylus tenuis R. B. Withers and R. A. Keble, Proc. Roy. Soc. Vic., n.s., 47 (1), p. 206, pl. 11, fig. 7 and text fig. 12 on p. 211. 22nd December, 1934.

M.U.G.D. No. 1497. Holotype, oral aspect, figured by Withers and Keble, loc. cit., 1934.

"Silurian (Yarravian Series)" (Withers and Keble, loc. cit., p. 207, 1934) = Upper Silurian (Melbournian).

"Moonee Ponds" (Withers and Keble, loc. cit., p. 207, 1934) = Cliff section, N. of Brunswick Road bridge, Moonee Ponds Creek, West Brunswick, Victoria.

Collected by E. S. Hills, 1926.

Furcaster bakeri Withers and Keble, 1934.

Furcaster bakeri R. B. Withers and R. A. Keble, Proc. Roy. Soc. Vic., n.s., 47 (1), p. 204, pl. 11, figs. 9, 10 and text figs. 10, 11 on p. 211, 22nd December, 1934.

M.U.G.D. No. 1498. Syntype, oral aspect, figured by Withers and Keble, loc. cit., fig. 9 and text fig. 10, 1934.

M.U.G.D. No. 1499 Syntype, aboral aspect (counterpart of No. 1498) figured by Withers and Keble, loc. cit., fig. 10 and text fig. 11, 1934.

"Silurian (Yarravian)" (Withers and Keble, loc. cit., p. 205, 1934) = Upper Silurian (Melbournian).

East side of new Yarra Boulevard, vicinity of Dight's Falls, Studley Park, Victoria. The specimen was not *in situ*.

Collected by G. Baker, 27.1.34.

Hallaster parvus Withers and Keble, 1934.

Taeniaster (?) aff. *spinosus* Billings: E. S. Hills, Proc. Roy. Soc. Vic., n.s., 41 (2), p. 179, 1929 (list name). Not *Taeniaster spinosus* E. Billings, Geol. Surv. Canada, Canadian Organic Remains, decade 3, p. 81, pl. 10, figs. 3*a-d*, 1858.

Hallaster parvus R. B. Withers and R. A. Keble, Proc. Roy. Soc. Vic., n.s., 47 (1), p. 203, pl. 11, figs. 5, 6, text figs. 8, 9 on p. 211, 22nd December, 1934.

M.U.G.D. No. 792. Syntype, oral aspect, figured by Withers and Keble, loc. cit., fig. 5 and text fig. 8, 1934.

M.U.G.D. No. 793. Syntype, aboral aspect (counterpart of No. 792), figured by Withers and Keble, loc. cit., fig. 6 and text fig. 9, 1934.

Silurian.

Blue Hills, Taggerty, Victoria.

Presented by E. S. Hills, 20.2.29.

Lapworthura pulcherrima Withers and Keble, 1934.

Lapworthura pulcherrima R. B. Withers and R. A. Keble, Proc. Roy. Soc. Vic., n.s., 47 (1), p. 201, pl. 11, figs. 1, 2 and text figs. 4, 5 on p. 201, 22nd December, 1934.

M.U.G.D. No. 1157. Syntype, aboral aspect, figured by Withers and Keble, loc. cit., fig. 1 and text fig. 4, 1934.

M.U.G.D. No. 1500. Syntype, oral aspect (counterpart of No. 1157), figured by Withers and Keble, loc. cit., fig. 2 and text fig. 5, 1934.

"Silurian (Yarravian Series)" (Withers and Keble, loc. cit., p. 202, 1934) = Upper Silurian (Melbournian).

"Dawson-street, West Brunswick, about quarter of a mile north of the Geological Survey of Victoria Locality Flemington (B8)" (Withers and Keble, loc. cit, p. 202, 1934), Victoria. The specimen came from a sewerage tunnel on the east side of Moonee Ponds Creek (D. McCance, personal communication).

Presented by D. M. McCance, July, 1927.

ECHINOIDEA.

Linthia mooraboolensis Pritchard, 1908.

Linthia mooraboolensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 21 (1), p. 394, pl. 22, figs. 1, 2; pl. 23, figs. 3, 4, August, 1908.

M.U.G.D. No. 1689. Holotype, figured by Pritchard, loc. cit., 1908.

Miocene (Batesfordian).

Filter Quarries (limestones), Moorabool River near Batesford, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

cf. Lovenia sp.

cf. *Lovenia* F. Chapman, Vic. Naturalist, 39 (11), p. 158, pl. 4, 2 figs., 8th March, 1923.

M.U.G.D. No. 555. Figured specimen, internal cast, figured by Chapman, loc. cit., 1923.

Lower Pliocene (Kalimnan?).

Sand-pit, Studley Park, Kew, Victoria.

Collected on geological excursion of Melbourne University students, 1917.

BRACHIOPODA.

Anoplia australis Gill, 1942.

Anoplia australis E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 38, pl. 4, fig. 8, 15th April, 1942.

M.U.G.D. No. 1720. HOLOTYPE, internal casts of dorsal and ventral valves, figured by Gill, loc. cit., 1942.

Lower Devonian (Yeringian).

Quarry in impure limestone, south side of Warburton highway, Seville, Victoria. Military Survey of Victoria, Ringwood Sheet, reference 497, 413.

Pres. Rev. E. D. Gill, 24.5.41.

Anoplia withersi Gill, 1942.

Anoplia withersi E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 39, pl. 4, fig. 7, 15th April, 1942.

M.U.G.D. No. 1721. HOLOTYPE, internal cast of ventral valve, figured by Gill, loc cit., 1942.

Lower Devonian (Yeringian).

Syme's Tunnel, Killara, Victoria.

Pres. Rev. E. D. Gill, 24.5.41.

Chonetes bipartita Chapman, 1913.

See *Stropheodonta bipartita* (Chapman, 1913).

Cyrtinopsis perlamellosus (J. Hall, 1857).

Spirifer perlamellosa J. Hall, Tenth Ann. Rept. New York State, Cabinet Nat. Hist., p. 57, figs. 1, 2, 1857.

Spirifer perlamellosus J. Hall, Nat. Hist. New York, Palaeont., 3, p. 201, pl. 26, figs. 1a-s, 2a-p, 1859. J. Hall and J. M. Clarke, Nat. Hist. New York, pt. 6, Palaeont., 8 (2), p. 15, pl. 35, figs. 7-13, 1894.

Spirifer (Delthyris) perlamellosus Hall: A. W. Grabau and H. W. Shimer, North American Index Fossils, 1, p. 320, text fig. 407 (p. 321), 1909.

Cyrtinopsis perlamellosus (Hall): J. Shirley, Quart. Journ. Geol. Soc. Lond., 94 (4), p. 482, pl. 44, figs. 9, 10, 1938. E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 42, pl. 6, figs. 6, 7, 1942.

M.U.G.D. No. 1722. HYPOTYPE, external mould of dorsal valve, figured by Gill, loc. cit., fig. 6, 1942.

M.U.G.D. No. 1723. HYPOTYPE, internal cast of ventral valve, figured by Gill, loc. cit., fig. 7, 1942.

Lower Devonian (Yeringian).

Hull Road, Mooroolbark, Victoria. E. D. Gill's Locality No. 13 (Proc. Roy. Soc. Vic, n.s., 52 (2), pp. 252 et seq., 1940).

Pres. Rev. E. D. Gill, 24.5.41.

Eospirifer densilineata (Chapman, 1908).

Spirifer perlamellosus J. Hall variety *densilineata* F. Chapman, Proc. Roy. Soc. Vic., n.s., 21 (1), p. 223, pl. 4, figs. 1, 2; pl. 5, August, 1908.

Eospirifer densilineata (Chapman): E. D. Gill, *ibid.*, 54 (1), p. 43, pl. 4, fig. 2, 1942.

M.U.G.D. No. 1715. HYPOTYPE, figured by Gill, loc. cit., 1942.

Lower Devonian (Yeringian).

Cemetery Hill Road, Whittlesea, Victoria (type locality). J. T. Jutson's Locality VII. (Proc. Roy. Soc. Vic., n.s., 21 (1), p. 213, pl. 3, 1908).

Pres. Rev. E. D. Gill, 24.5.41.

Fascicostella gervillei (Defrance, 1827).

Strophomenes gervillei M. J. L. Defrance, Dict. Sci. nat., 32, 51, p. 152, 1827.

Orthis gervillei Defrance: J. Barrande, Haidinger, Naturwiss. Abh. II, 1 Abth., p. 48, pl. 19, fig. 10, 1848. J. Barrande, Syst. sil. Bohême, 5, pl. 58, figs. 10*a-e*; pl. 60, fig. II, 1A, 2*c*, 3*a*, 4*c*; pl. 126, fig. II, 3*a*, *b*, 4*c*, 1879. C. Barrois, Mém. Soc. Géol. Nord, 2 (1), p. 237, pl. 9, fig. 1, 1882. D. P. Oehlert, Ann. Sci. géol., 19, p. 44, pl. 4, figs. 45-55, 1886. P. Assmann, Jahrb. K. preuss. geol. Landesanst., 31 (1), p. 161, pl. 10, fig. 3, 1910. F. Herrmann, *ibid.*, 33 (1), p. 349, pl. 21, figs. 4, 5, 1912. T. Hüffner, *ibid.*, 37 (1), p. 291. W. Paeckelmann, Abh. preuss. geol. Landesanst. N. F. 98, p. 116, 1925. R. Kozlowski, Palaeont. Polonica, 1, p. 70, pl. 1, fig. 32, 1929.

Dalmanella gervillei Defrance: W. Paeckelmann and H. Sieverts, Abh. preuss. geol. Landesanst. N.F. 142, p. 31, 1932.

Fascicostella gervillei Defrance: C. Schuchert and G. A. Cooper, Amer. Journ. Sci., [5] 22, p. 246, 1931. C. Schuchert and G. A. Cooper, Mem. Peabody Mus. Nat. Hist., 4, p. 129, pl. 92, figs. 12, 15, 1932. J. Shirley, Quart. Journ. Geol. Soc. Lond., 94 (4), p. 466, pl. 41, figs. 4-6, 1938. E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 37, pl. 6, figs. 3-5, 1942.

M.U.G.D. No. 1728. Hypotype, internal cast of ventral valve, figured by Gill, loc. cit., fig. 3, 1942.

M.U.G.D. No. 1729. Hypotype, internal cast of ventral valve, figured by Gill, loc. cit., fig. 4, 1942.

M.U.G.D. No. 1730. Hypotype, internal cast of dorsal valve, figured by Gill, loc. cit., fig. 5, 1942.

Lower Devonian (Yeringian).

Melbourne Hill, Lilydale, Victoria. E. D. Gill's Locality No. 7 (Proc. Roy. Soc. Vic., n.s., 52 (2), pp. 252, 259, 1940).

Pres. Rev. E. D. Gill, 24.5.41.

Hipparionyx minor Clarke, 1909.

Hipparionyx minor J. M. Clarke, Mem. New York State Mus., 9 (2), p. 124, pl. 31, figs. 16-20, 1909. J. Shirley, Quart. Journ. Geol. Soc. Lond., 94 (4), p. 472, pl. 42, figs. 1-6, 1938. E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 39, pl. 5, figs. 1, 10; pl. 6, fig. 2, 1942.

M.U.G.D. No. 1731. Hypotype, internal cast of ventral valve, figured by Gill, loc. cit., fig. 1, 1942.

M.U.G.D. No. 1732. Hypotype, external mould of ventral valve, counterpart of No 1731, figured by Gill, loc. cit., fig. 10, 1942.

Lower Devonian (Yeringian).

Hull Road, Mooroolbark, Victoria. E. D. Gill's Locality No. 13 (Proc. Roy. Soc. Vic., n.s., 52 (2), pp. 252 et seq., 1940).

Pres. Rev. E. D. Gill, 24.5.41.

Leptaena rhomboidalis (Wilckens, 1769).

Conchita rhomboidalis C. F. Wilckens, Nachr. Selt. Verst., p. 77, pl. 8, figs. 43, 44, 1769.

Strophomena rhomboidalis Wilckens sp.: J. Barrande, Syst. sil. Bohême, 5, p. 197, pl. 41, figs. 25*a-c*, 30*a*, *b*, 1879.

Leptaena rhomboidalis (Wilckens): J. Hall and J. M. Clarke, Nat. Hist. New York, pt. 6, Palaeont., 8 (1), pl. 8, figs. 20-27, 1892. A. W. Grabau and H. W. Shimer, North American Index Fossils, 1, p. 226, text-fig. 273*b*, 1909.

Leptaena (*Leptagonia*) *rhomboidalis* (Wilckens): F. McCoy, Prodromus Palaeont. Vic. Decade 5, p. 19, pl. 46, fig. 1, 1877.

[?] *Leptaena rhomboidalis* Wilckens sp.: F. Chapman, Proc. Roy. Soc. Vic., n.s., 26 (1), pp. 101, 102, pl. 10, fig. 3 (non p. 104, pl. 10, figs. 4, 7), 1913.

Leptaena rhomboidalis (Wilckens): E. D. Gill, *ibid.*, 54 (1), p. [illegible], pl. 5, figs. 5, 6, 1942.

M.U.G.D. No. 1718. Hypotype, internal mould of dorsal valve, figured by Gill, loc. cit., fig. 5, 1942.

M.U.G.D. No. 1719. HYPOTYPE, external cast, counterpart of No. 1718, figured by Gill, loc. cit., fig. 8, 1942.

Lower Devonian (Yeringian).

Hull Road, Mooroolbark, Victoria. E. D. Gill's Locality No. 13 (Proc. Roy. Soc. Vic., n.s., 52 (2), pp. 252 et seq., 1940).

Pres. Rev. E. D. Gill, 24.5.41.

Nucleospira cf. **marginata** Maurer, 1886.

Nucleospira marginata F. Maurer, Die Fauna des rechtsrheinischen Unterdevon, Darmstadt, p. 19, 1886. L. Beushausen, Jahrb. K. preuss. geol. Landesanst., 17, p. 289, pl. 5, figs. 8-12, 1897.

Nucleospira cf. *marginata* Maurer: J. Shirley, Quart. Journ. Geol. Soc. Lond., 94 (4), p. 481, pl. 94, figs. 6-8, 1938. E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 43, pl. 4, fig. 5; pl. 5, fig. 6, 1942.

M.U.G.D. No. 1726. HYPOTYPE, internal cast of ventral valve, figured by Gill, loc. cit., pl. 4, fig. 5, 1942.

M.U.G.D. No. 1727. HYPOTYPE, internal cast of ventral valve, figured by Gill, loc. cit, pl. 5, fig. 6, 1942.

Lower Devonian (Yeringian).

Hull Road, Mooroolbark, Victoria. E. D. Gill's Locality No. 13 (Proc. Roy. Soc. Vic., n.s., 52 (2), pp. 252 et. seq., 1940).

Pres. Rev. E. D. Gill, 24.5.41.

Schizophoria provulvaria (Maurer, 1893).

Orthis provulvaria F. Maurer, Neues Jahrb. f. Min., 1, p. 7, pl. 3, figs. 1-4, 1893.

Schizophoria provulvaria (Maurer): F. Drevermann, Palaeontographica, 1, p. 267, pl. 30, figs. 29, 30, 1904. C. Schuchert and G. A. Cooper, Mem. Peabody Mus. Nat. Hist., 4 (1), pl. 23, fig. 11, 1932. E. Maillieux, Mém. Mus. roy. Hist. nat. Belg., 23, p. 53, 1936. J. Shirley, Quart. Journ. Geol. Soc. Lond., 94 (4), p. 465, pl. 40, figs. 10-13, 1938. E. D. Gill, Proc. Roy. Soc. Vic., n.s., 54 (1), p. 63, pl. 6, fig. 1, 1942.

M.U.G.D. No. 1733. HYPOTYPE, internal cast of ventral valve, figured by Gill, loc. cit., 1942.

Lower Devonian (Yeringian).

Hull Road, Mooroolbark, Victoria. E. D. Gill's Locality No. 13 (Proc. Roy. Soc. Vic., n.s., 52 (2), pp. 252 et. seq., 1940).

Pres. Rev. E. D. Gill, 24.5.41.

(?) **Siphonotreta lancefieldiensis** Sherrard, 1930.

(?) *Siphonotreta lancefieldiensis* K. Sherrard, Proc. Roy. Soc. Vic., n.s., 42 (2), p. 137, pl. 11, fig. 4, 13th March, 1930.

M.U.G.D. No. 995. HOLOTYPE, figured by Sherrard, loc. cit., 1930.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Coll. Sept., 1923 and pres. Mrs. K. Sherrard, 12.12.29.

Spirifer perlamellosus J. Hall, 1857.

See *Cyrtinopsis perlamellosus* (J. Hall, 1857).

Spirifer perlamellosus J. Hall var. **densilineata** Chapman, 1908.

See *Eospirifer densilineata* (Chapman, 1908).

Stropheodonta bipartita (Chapman, 1913).

Chonetes bipartita F. Chapman, Proc. Roy. Soc. Vic., n.s., 26 (1), p. 104, pl. 10, figs. 8-10, September, 1913.

Stropheodonta bipartita (Chapman): E. D. Gill, *ibid.*, 54 (1), p. 41, pl. 5, figs. 7, 9; pl. 6, fig. 10, 1942.

M.U.G.D. No. 1724. HYPOTYPE, external moulds of both valves, figured by Gill, loc. cit., pl. 5, fig. 9; pl. 6, fig. 10, 1942.

M.U.G.D. No. 1725. HYPOTYPE, internal casts of both valves, counterpart of No. 1724, figured by Gill, loc. cit., pl. 5, fig. 7, 1942.

Lower Devonian (Yeringian).

Yellingbo, Victoria. " . . . a low cutting on the road running west from the picnic ground beside Woori Yallock Creek, about a quarter of a mile from the creek " (Gill, loc. cit., p. 26, 1942).

Pres. Rev. E. D. Gill, 24.5.41.

PELECYPODA.

Antigona (Proxichione) cognata (Pritchard, 1903).

See *Chione cognata* Pritchard, 1903.

Antigona (Proxichione) etheridgei (Pritchard, 1903).

See *Chione etheridgei* Pritchard, 1903.

Arca capulopsis Pritchard, 1901.

Arca capulopsis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 23, pl. 2, figs. 1, 2, August, 1901.

M.U.G.D. No. 1773. HOLOTYPE, left valve, figured by Pritchard, loc. cit., 1901.

Miocene (Balcombian).

Orphanage Hill, Fyansford, near Geelong, Victoria.

Coll. T. S. Hall. Purchased from Dr. G. B. Pritchard, 11.10.39.

Aulacomya mooraboolensis (Pritchard, 1903).

See *Mytilus mooraboolensis* Pritchard, 1903.

Cardita excrescens Pritchard, 1903:—**Venericardia excrescens** (Pritchard, 1903).

Cardita excrescens G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 94, pl. 12, figs. 2, 3, February, 1903.

M.U.G.D. No. 1753. HOLOTYPE, left valve, figured by Pritchard, loc. cit., 1903.

Miocene (Balcombian).

Shores of Lake Bullen Merri, near Camperdown, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Cardita maudensis Pritchard, 1895:—**Venericardia maudensis** (Pritchard, 1895).

Cardita maudensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 7, p. 229, pl. 12, figs. 6, 7, January, 1895. G. F. Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 360, 1897.

M.U.G.D. No. 1745. SYNTYPE, right valve, figured by Pritchard, loc. cit., fig. 6, 1895.

M.U.G.D. No. 1746. SYNTYPE, left valve, figured by Pritchard, loc. cit., fig. 7, 1895.

Miocene (Janjukian?).

"Lower Eocene calcareous sands, Moorabool Valley near Maude" (Pritchard, 1895) = Lower beds, Maude, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Carditella regularis Pritchard, 1901.

Carditella regularis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 28, pl. 2, fig. 5, August, 1901.

M.U.G.D. No. 1775. HOLOTYPE, right valve, figured by Pritchard, loc. cit., 1901.

Grice's Creek, between Frankston and Mornington, Port Phillip, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Chione cognata Pritchard, 1903:—**Antigona (Proxichione) cognata** (Pritchard, 1903).

Chione cognata G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 101, pl. 12, fig. 5, February, 1903.

M.U.G.D. No. 1755. HOLOTYPE, left valve, figured by Pritchard, loc. cit., 1903.

Lower Pliocene (Kalimnan).

Grange Burn, below Forsyth's, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Chione etheridgei Pritchard, 1903:—**Antigona (Proxichione) etheridgei** (Pritchard, 1903).

Chione etheridgei G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 99, pl. 12, fig. 1, February, 1903.

M.U.G.D. No. 1752. HOLOTYPE, left valve, figured by Pritchard, loc. cit., 1903.

Miocene (Janjukian).

"Lower beds of the Spring Creek series or Bird Rock Bluff, near Geelong" (Pritchard, loc. cit., p. 100, 1903) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Chione halli Pritchard, 1895.

Chione halli G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 7, p. 229, pl. 12, figs. 10-12, January, 1895. Not *Chione hallii* R. Tate, Trans. Roy. Soc. S. Aust., 24 (2), p. 107, pl. 2, fig. 5, 1901 (=*Chione roberti* G. B. Pritchard, nom. mut., Vic. Naturalist, 23 (6), p. 117, 4th October, 1906.)

M.U.G.D. No. 1749. SYNTYPE, right valve, figured by Pritchard, loc. cit., fig. 10, 1895.

M.U.G.D. No. 1750. SYNTYPE, left valve, figured by Pritchard, loc. cit., fig. 11, 1895.

[illegible]

M.U.G.D. No. 1751. Syntype, right valve, figured by Pritchard, loc. cit., fig. 12, 1895.

Miocene (Janjukian).

"Lower Eocene sands and clays of Spring Creek, 14 miles south of Geelong" (Pritchard, 1895) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Chlamys asperrimus asperrimus (Lamarck, 1819).

Pecten asperrimus J. P. B. A. Lamarck, Hist. Nat. Anim. s. Vert., 11, p. 174, 1819. B. Delessert, Rec. Coq. décr. par Lamarck dans son Hist. Nat. Anim. s. Vert. et non encore figurées, pl. 15, figs. 1*a*, 1*b*, 1841.

Chlamys apserrimus asperrimus (Lamarck, 1819): J. H. Gatliff and F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 42 (2), p. 73, pl. 2, figs. 1, 2; pl. 3, fig. 5; pl. 4, fig. 10, March, 1930.

M.U.G.D. No. 989. Hypotype, figured by Gatliff and Singleton, loc. cit., pl. 2, fig. 1; pl. 4, fig. 11, 1930.

M.U.G.D. No. 990. Hypotype, counterpart of No. 989, figured by Gatliff and Singleton, loc. cit., pl. 3, fig. 5, 1930.

M.U.G.D. No. 991. Hypotype, figured by Gatliff and Singleton, loc. cit., pl. 2, fig. 2, 1930.

M.U.G.D. No. 992. Counterpart of hypotype No. 991.

Recent.

Westernport, Victoria (dredged).

Pres. J. H. Gatliff, 8.8.29.

Crassatellites camurus Pritchard, 1903:—**Eucrassatella camura** (Pritchard, 1903).

Crassatellites camurus G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 96, pl. 14, figs. 5-9, February, 1903.

M.U.G.D. No. 1761. Syntype, left valve, figured by Pritchard, loc. cit., fig. 5, 1903.

M.U.G.D. No. 1762. Syntype, right valve, figured by Pritchard, loc. cit., fig. 6, 1903.

Lower Pliocene (Kalimnan).

Grange Burn, between Forsyth's and Henty's, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

M.U.G.D. No. 1763. Syntype, juvenile left valve, figured by Pritchard, loc. cit., fig. 7, 1903.

M.U.G.D. No. 1764. Syntype, juvenile right valve, figured by Pritchard, loc. cit., fig. 8, 1903.

M.U.G.D. No. 1765. Syntype, juvenile right valve, figured by Pritchard, loc. cit., fig. 9, 1903.

M.U.G.D. No. 1766. Syntype, juvenile left valve, unfigured.

Lower Pliocene (Kalimnan).

"Muddy Creek, near the State School" (Pritchard, loc. cit., p. 97, 1903) = MacDonald's, Muddy Creek, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

The above shells (Nos. 1761-6) were in a box with a label in Pritchard's handwriting, "Crassatellites camarus [*sic*] Pritchard. Types. Miocene. Grange Burn and Muddy Creek, W. Vic." They have been allocated to the above localities upon their mode of preservation.

Crassatellites kingicoloides Pritchard, 1903:—**Eucrassatella kingicoloides** (Pritchard, 1903).

Crassatellites kingicoloides G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 94, pl. 13, figs. 1-3, February, 1903.

M.U.G.D. No. 1756. HOLOTYPE, paired valves, figured by Pritchard, loc. cit., 1903.

Lower Pliocene (Kalimnan).

Jimmy's Point [= Jemmy's Point], Kalimna, Gippsland Lakes, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Crassatellites maudensis Pritchard, 1903:—**Eucrassatella maudensis** (Pritchard, 1903).

Crassatellites maudensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 93, pl. 14, figs. 2, 3, February, 1903.

M.U.G.D. No. 1758. SYNTYPE, right valve, figured by Pritchard, loc. cit., fig. 2, 1903.

M.U.G.D. No. 1759. SYNTYPE, right valve, figured by Pritchard, loc. cit., fig. 3, 1903.

Miocene (Janjukian).

"Lower and Middle beds of the Spring Creek series, or Bird Rock Bluff, near Geelong" (Pritchard, loc. cit., p. 94, 1903) = Bird Rock cliffs, near Spring Creek, Torquay, Victoria. The inner lid of box bears "Spring Creek" only.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Cucullaea corioensis praelonga Singleton, 1932:—**Cucullaea praelonga** (Singleton, 1932).

Cucullaea corioensis F. McCoy, Prodromus Palaeont. Vic., decade 3, pl. 27, figs. 3(?), 5a (*non* 4, 5), 1876.

Cucullaea corioensis praelonga F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 44 (2), p. 303, pl. 26, figs. 20*a*, *b*, 20th April, 1932.

M.U.G.D. No. 1320. HOLOTYPE, right valve, figured by Singleton, loc. cit., 1932.

Lower Pliocene (Kalimnan).

"Forsyth's," Grange Burn, near Hamilton, Victoria.

Coll. H. S. Summers. Presented by F. A. Singleton, 29.2.32. It was formerly No. 5 in F. A. Singleton's private collection.

Cucullaea praelonga (Singleton, 1932).

See *Cucullaea corioensis praelonga* Singleton, 1932.

Cucullaea (Cucullona) psephea Singleton, 1943.

Cucullaea (Cucullona) psephea F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 55 (2), p. 270, pl. 13, figs. 7*a*, *b*; 8*a*, *b*, October, 1943.

M.U.G.D. No. 1869. HOLOTYPE, right valve, figured by Singleton, loc. cit., fig. 7*a*, *b*, 1943.

M.U.G.D. No. 1870. PARATYPE, right valve, figured by Singleton, loc. cit., fig. 8*a*, *b*, 1943.

Eocene.

Second point north-west of Pebble Point, coastal cliffs 2½ miles south-east of Princetown, Victoria.

Coll. Jan., 1942, and pres. G. Baker, Jan., 1943.

Dosinia densilineata Pritchard, 1896.

Dosinia densilineata G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 8, p. 135, pl. 4, figs. 5-7, April, 1896.

M.U.G.D. No. 1738. SYNTYPE, left valve, figured by Pritchard, loc. cit., fig. 5, 1896.

M.U.G.D. No. 1739. SYNTYPE, paired valves, figured by Pritchard, loc. cit., fig. 6, 1896.

M.U.G.D. No. 1740. SYNTYPE, right valve, figured by Pritchard, loc. cit., fig. 7, 1896.

Miocene (Janjukian).

"Lower Eocene sandy beds of Spring Creek, near Geelong" (Pritchard, loc. cit., p. 137, 1896) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Eotrigonia intersitans (Tate, 1896).

See *Trigonia tatei* Pritchard, 1895.

Eotrigonia lutosa (Pritchard, 1903).

See *Trigonia semiundulata* Jenkins var. *lutosa* Pritchard, 1903.

Eotrigonia semiundulata (Jenkins, 1865).

See *Trigonia semiundulata* Jenkins, 1895.

Eotrigonia semiundulata granosa (Pritchard, 1903).

See *Trigonia semiundulata* Jenkins var. *granosa* Pritchard, 1903.

Eucrassatella camura (Pritchard, 1903).

See *Crassatellites camurus* Pritchard, 1903.

Eucrassatella kingicoloides (Pritchard, 1903).

See *Crassatellites kingicoloides* Pritchard, 1903.

Eucrassatella maudensis (Pritchard, 1903).

See *Crassatellites maudensis* Pritchard, 1903.

Glycimeris halli Pritchard, 1903:—**Glycymeris halli** (Pritchard, 1903).

Glycimeris halli G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 89, pl. 15, figs. 1, 2, 8, February, 1903.

Glycymeris halli, Pritchard: F. Chapman and F. A. Singleton, *ibid.*, 37 (1), p. 40, pl. 3, fig. 25; pl. 4, fig. 15, 1925.

M.U.G.D. No. 1783. HOLOTYPE, left valve, figured by Pritchard, loc. cit., figs. 1, 2, 1903.

M.U.G.D. No. 1784. PARATYPE, juvenile left valve, figured by Pritchard, loc. cit., fig. 8, 1903.

Lower Pliocene (Kalimnan).

Upper beds, Muddy Creek, near Hamilton, Victoria.

While the above type material is marked as from "M.C." = Muddy Creek, this term is commonly used to include the upper beds at the adjacent stream, Grange Burn. Pritchard (loc. cit., p. 91, 1903) includes as localities "Grange Burn, between Forsyth's and Henty's, from the clays and sands of the upper series; Muddy Creek, from the upper beds below the State School." This latter locality is commonly known as MacDonald's, Muddy Creek. The paratype is probably, on its mode of preservation, from near Forsyth's, Grange Burn: whether the holotype is from Forsyth's or MacDonald's is uncertain.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Glycimeris halli Pritchard var. **intermedius** Pritchard, 1903:—
Glycymeris halli mistio (Finlay, 1927).

Glycimeris halli Pritchard, variety *intermedius* G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 90, pl. 14, figs. 10, 11, February, 1903. Not *Pectunculus intermedius* Broderip, Proc. Zool. Soc. Lond., pt. 2, p. 126, 1832.

Glycymeris halli var. *intermedia* Pritchard: F. Chapman and F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 37 (1), p. 41, 1925.

Glycimeris halli mistio H. J. Finlay, nom. nov., Trans. N.Z. Inst., 57, p. 524, 1927.

M.U.G.D. No. 1785. SYNTYPE, right valve, figured by Pritchard, loc. cit., fig. 10, 1903.

M.U.G.D. No. 1786. SYNTYPE, right valve, figured by Pritchard, loc. cit., fig. 11, 1903.

Lower Pliocene (Kalimnan).

Upper beds, Muddy Creek, near Hamilton, Victoria.

The same remarks apply to this as to the preceding, but the coloration of the specimens suggests that they are from MacDonald's, Muddy Creek.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Glycimeris halli Pritchard var. **paucicostatus** Pritchard, 1903:—
Glycymeris halli paucicostata (Pritchard, 1903).

Glycimeris halli Pritchard, variety *paucicostatus* G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 90, pl. 14, fig. 12; pl. 15, fig. 9, February, 1903.

Glycymeris halli var. *paucicostata* Pritchard: F. Chapman and F. A. Singleton, *ibid.*, 37 (1), p. 42, 1925.

M.U.G.D. No. 1787. SYNTYPE, left valve, figured by Pritchard, loc. cit., pl. 14, fig. 12, 1903.

M.U.G.D. No. 1788. SYNTYPE, left (?) valve, figured by Pritchard, loc. cit., pl. 15, fig. 9, 1903.

Lower Pliocene (Kalimnan).

"Sandy clays of Jimmy's Point, Gippsland" (Pritchard, loc. cit., p. 91, 1903) = Jemmy's Point, Kalimna, Gippsland Lakes, Victoria.

Glycymeris (Grandaxinaea) granti Singleton, 1932.

Glycymeris (Grandaxinaea) granti F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 44 (2), p. 294, pl. 24, figs. 10*a*, 10*b*, 11, April, 1932.

M.U.G.D. No. 1315. HOLOTYPE, left valve, figured by Singleton, loc. cit., figs. 10*a*, 10*b*, 1932.

M.U.G.D. No. 1316. PARATYPE, right valve, figured by Singleton, loc. cit., fig. 11, 1932.

Miocene (Balcombian).

Lower Beds, Muddy Creek, near Hamilton, Victoria.

Pres. F. H. McK. Grant, 24.6.31.

Glycymeris halli (Pritchard, 1903).

See *Glycimeris halli* Pritchard, 1903.

Glycymeris halli mistio (Finlay, 1927).

See *Glycimeris halli* Pritchard var. *intermedius* Pritchard, 1903.

Glycymeris halli paucicostata (Pritchard, 1903).

See *Glycimeris halli* Pritchard var. *paucicostatus* Pritchard, 1903.

Glycymeris (Veletuceta) pseudaustralis Singleton, 1941.

Glycymeris (*Veletuceta*) *pseudaustralis* F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 53 (2), p. 425, pl. 20, figs. 4, 5, July, 1941.

M.U.G.D. No. 1674. HOLOTYPE, right valve, figured by Singleton, loc. cit., fig. 4, 1941.

M.U.G.D. No. 1675. PARATYPE, right valve, figured by Singleton, loc. cit., fig. 5, 1941.

Upper Pliocene (Werrikooian).

Glenelg River at "Roscoe's", Parish of Killara, Victoria. (Holotype No. 1674.)

Caldwell's Cliff, Glenelg River, Parish of Werrikoo, Victoria. (Paratype No. 1675.)

Coll and pres. F. A. Singleton, 12.12.40.

Lahillia australica Singleton, 1943.

Lahillia australica F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 55 (2), p. 273, pl. 12, figs. 3-5, October, 1943.

M.U.G.D. No. 1865. HOLOTYPE, left valve, figured by Singleton, loc. cit., fig. 5, 1943.

Eocene.

Second point north-west of Pebble Point, coastal cliffs 2½ miles south-east of Princetown, Victoria.

Coll. Jan., 1942, and pres. G. Baker, Jan., 1943.

M.U.G.D. No. 1866. PARATYPE, right valve, figured by Singleton, loc. cit., fig. 3, 1943.

M.U.G.D. No. 1867. PARATYPE, left valve, figured by Singleton, loc. cit., fig. 4, 1943.

Eocene.

East side of Pebble Point, coastal cliffs 2½ miles south-east of Princetown, Victoria.

Coll. Oct., 1915, and pres. W. J. Parr, Dec., 1942.

Leda acuticauda Pritchard, 1901:—**Nuculana acuticauda** (Pritchard, 1901).

Leda acuticauda G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 27, pl. 3, figs. 4, 4*a*, August, 1901.

M.U.G.D. No. 1781. HOLOTYPE, paired valves, figured (right valve) by Pritchard, loc. cit., 1901.

M.U.G.D. No. 1782. PARATYPE, right valve, unfigured.

Miocene (Balcombian).

Grice's Creek, between Frankston and Mornington, Port Phillip, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Leda fontinalis Pritchard, 1901: — **Nuculana fontinalis** (Pritchard, 1901).

Leda fontinalis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 28, pl. 3, figs. 3, 3*a*, August, 1901.

M.U.G.D. No. 1779. HOLOTYPE, paired valves, figured (left valve) by Pritchard, loc. cit., 1901. Now separated into left (1779A) and right (1779B) valves.

M.U.G.D. No. 1780. PARATYPE, left valve, unfigured.

"Lower beds of the Spring Creek or Bird Rock Bluff section, near Geelong" (Pritchard, loc. cit., p. 28, 1901) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Limopsis chapmani Singleton, 1932.

"*Limopsis aurita* (Brocchi)": F. McCoy, Prodromus Palaeont. Vic., decade 2, p. 23, pl. 19, figs. 5, 6, 6*a*, *b*, 7, 1875. R. Tate, Pap. Roy. Soc. Tas. for 1884, p. 212, 1885. R. Tate, Trans. Roy. Soc. S. Aust., 8, p. 134, 1886. R. M. Johnston, Geology of Tasmania, pl. 32, fig. 7, 1888. Not *Arca aurita* Brocchi, Conchiologia Fossile Subapennina, p. 485, pl. 11, figs. 9*a*, *b*, 1814.

"*Limopsis insolita* (G. B. Sowerby)": R. Tate, Trans. Roy. Soc. S. Aust., 8, p. 134, 1886. G. F. Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 344, 1897. F. Chapman, Proc. Roy. Soc. Vic., n.s., 23 (2), p. 425, pl. 84, fig. 5; pl. 85, fig. 11, 1911. Not *Trigonocoelia insolita* G. B. Sowerby, in C. Darwin, Geol. Obs. S. Amer., p. 252 (2nd ed., p. 608, 1876), pl. 2, figs. 20, 21, 1846.

Limopsis chapmani F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 44 (2), p. 296, pl. 24, figs. 12-14; pl. 25, figs. 16*a-c*, 20th April, 1932.

M.U.G.D. No. 1317. HOLOTYPE, right valve of pair, figured by Singleton, loc. cit., figs. 16*a-c*, 1932.

M.U.G.D. No. 1318. PARATYPE, right valve, figured by Singleton, loc. cit., fig. 12, 1932.

M.U.G.D. No. 1319. PARATYPE, right valve, figured by Singleton, loc. cit., fig. 13, 1932.

Miocene (Janjukian).

Lower beds, Bird Rock Cliffs, near Spring Creek, Torquay, Victoria.

Coll. and pres. F. A. Singleton, 29.2.32.

Limopsis morningtonensis Pritchard, 1901.

Limopsis morningtonensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 24, pl. 2, figs. 6, 6*a*, August, 1901. F. Chapman, *ibid.*, 23 (2), p. 420, pl. 83, fig. 1; pl. 85, fig. 7, 1911.

M.U.G.D. No. 1778. HOLOTYPE, left valve, figured by Pritchard, loc. cit., 1901.

Miocene (Balcombian).

"Eocene clays of Gellibrand River, coast section below Curdie's Steps" (Pritchard, loc. cit., p. 24, 1903), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Limopsis sp.

Limopsis sp. nov. (?), F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 55 (2), p. 271, pl. 12, figs. 2*a*, *b*, October, 1943.

M.U.G.D. No. 1872. Figured Specimen, left valve, figured by Singleton, loc. cit., 1943.

Eocene.

Second point north-west of Pebble Point, coastal cliffs 2½ miles south-east of Princetown, Victoria.

Coll. Jan., 1942, and pres. G. Baker, Jan., 1943.

Lithophagus latecaudatus Pritchard, 1903:—**Modiolus latecaudatus** (Pritchard, 1903).

Lithophagus latecaudatus G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 88, pl. 14, fig. 4, February, 1903.

M.U.G.D. No. 1760. Holotype, left valve, figured by Pritchard, loc. cit., 1903.

Miocene (Janjukian).

"Lower beds of the Spring Creek series, or Bird Rock Bluff, near Geelong" (Pritchard, loc. cit., p. 88, 1903) = Lower Beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Dr. Pritchard states (personal communication) the type to have come from near the "ledge", a well-known locality near the base of the cliffs just south-west of Bird Rock. The species is, however, not uncommon in the lowest bed, bluish clay, exposed in the centre of the half dome at this locality, and it is probable that the type is from this bed.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Lucina gunyoungensis Pritchard, 1903.

Lucina gunyoungensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 98, pl. 14, fig. 13, February, 1903.

M.U.G.D. No. 1767. Holotype, right valve, figured by Pritchard, loc. cit., 1903.

Miocene (Balcombian).

Grey clays of Grice's Creek = Gunyoung Creek, Mornington.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Lucina (Prolucina) mitchelli Pritchard, 1913:—**Prolucina mitchelli** (Pritchard, 1913).

Lucina (Prolucina) mitchelli G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 25 (2), p. 365, pl. 29, figs. 1-3, March, 1913.

M.U.G.D. No. 1668. Holotype, figured by Pritchard, loc. cit., 1913.

Lower Devonian (Yeringian).

"Cave Hill Quarries, Lilydale. Silurian limestone fauna" (Pritchard, loc. cit., p. 364, 1913) = Mitchell's quarry, Cave Hill, near Lilydale, Victoria.

Collected by S. R. Mitchell. Purchased from Dr. G. B. Pritchard, 11.10.39.

Modiola praerupta Pritchard, 1901:—**Modiolus praeruptus** (Pritchard, 1901).

Modiola praerupta G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 25, pl. 2, figs. 3, 4, August, 1901.

M.U.G.D. No. 1774. HOLOTYPE, right valve, figured by Pritchard, loc. cit., 1901.

Miocene (Balcombian).

"Eocene Septarian Limestones, near the Old Cement Works, Balcombe's Bay, Mornington" (Pritchard, loc. cit., p. 26, 1901), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Modiola pueblensis Pritchard, 1901:—**Modiolus pueblensis** (Pritchard, 1901).

Modiola pueblensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 26, pl. 3, fig. 1, August, 1901.

M.U.G.D. No. 1777. HOLOTYPE, left valve, figured by Pritchard, loc. cit., 1901.

Miocene (Janjukian).

"Lower beds of the Spring Creek or Bird Rock Bluff, near Geelong" (Pritchard, loc. cit., p. 27, 1901) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Modiolus praeruptus Pritchard, 1901.

See *Modiola praerupta* (Pritchard, 1901).

Modiolus pueblensis (Pritchard, 1901).

See *Modiola pueblensis* Pritchard, 1901.

Modiolaria balcombei Pritchard, 1901:—**Musculus balcombei** (Pritchard, 1901).

Modiolaria balcombei G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 29, pl. 3, fig. 2, August, 1901.

M.U.G.D. No. 1776. HOLOTYPE, figured by Pritchard, loc. cit., 1901.

Miocene (Balcombian).

"Eocene clays from the Old Cement Works, Balcombe's Bay, Mornington" (Pritchard, loc. cit., p. 30, 1901), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Modiolus latecaudatus (Pritchard, 1903).

See *Lithophagus latecaudatus* Pritchard, 1903.

Musculus balcombei (Pritchard, 1901).

See *Modiolaria balcombei* Pritchard, 1901.

Myochama trapezia Pritchard, 1895.

Myochama trapezia G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 7, p. 227, pl. 12, figs. 8, 9, January, 1895.

M.U.G.D. No. 1747. SYNTYPE, left valve, figured by Pritchard, loc. cit., fig. 8, 1895.

M.U.G.D. No. 1748. SYNTYPE, right valve, figured by Pritchard, loc. cit., fig. 9, 1895.

Miocene (Balcombian).

Blue clays, Curlewis, Bellarine Peninsula, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Mytilicardia kalimnae Pritchard, 1903.

Mytilicardia kalimnae G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 97, pl. 12, fig. 4, February, 1903.

M.U.G.D. No. 1754. HOLOTYPE, left valve, figured by Pritchard, loc. cit., 1903.

Lower Pliocene (Kalimnan).

Jimmy's Point [= Jemmy's Point], Kalimna, Gippsland Lakes, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Mytilus mooraboolensis Pritchard, 1903:—**Aulacomya mooraboolensis** (Pritchard, 1903).

Mytilus mooraboolensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 88, pl. 14, fig. 1, February, 1903.

M.U.G.D. No. 1757. HOLOTYPE, right valve, figured by Pritchard, loc. cit., 1903.

Miocene (Janjukian).

"Lower beds of the Spring Creek series, or Bird Rock Bluff, near Geelong" (Pritchard, loc. cit., p. 89, 1903) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Nucula (Ennucula) gricei Singleton, 1941.

"*Nucula tenisoni* Pritchard": F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 44 (2), p. 290, pl. 24, figs. 5*a*, 5*b*, April, 1932. Not *Nucula tenisoni* G. B. Pritchard, *ibid.*, 8, p. 128, April, 1896.

Nucula (Ennucula) gricei F. A. Singleton, *ibid.*, 53 (2), p. 423, pl. 20, figs. 1*a*, 1*b*, July, 1941.

M.U.G.D. No. 1311. HOLOTYPE, figured by Singleton, loc. cit., 1932 (as hypotype of *N. tenisoni*) and loc. cit., 1941.

Miocene (Balcombian).

Grice's Creek, between Frankston and Mornington, Victoria.

Coll and pres. F. A. Singleton, 29.2.32.

Nucula kalimnae Singleton, 1932:—**Nucula (Ennucula) kalimnae** Singleton, 1932.

"*Nucula tumida* Tenison-Woods": R. Tate, Trans. Roy. Soc. S. Aust., 8, p. 127, pl. 6, figs. 6*a*, 6*b*, May, 1886. Not *Nucula tumida* J. E. T. Woods, Pap. Proc. Roy. Soc. Tas. for 1876, p. 111, 1877.

Nucula kalimnae F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 44 (2), p. 292, pl. 24, figs. 7*a*, 7*b*, 8*a*, 8*b*, 9, April, 1932.

M.U.G.D. No. 1312. HOLOTYPE, figured by Singleton, loc. cit., figs. 7*a*, 7*b*, 1932.

Lower Pliocene (Kalimnan).

Jemmy's Point, Kalimna, Victoria.

Coll. and pres. F. A. Singleton, 29.2.32.

M.U.G.D. No. 1313. PARATYPE, figured by Singleton, loc. cit., figs. 8*a*, 8*b*, 1932.

M.U.G.D. No. 1314. PARATYPE, figured by Singleton, loc. cit., fig. 9, 1932.

Lower Pliocene (Kalimnan).

Upper beds, Muddy Creek, near Hamilton, Victoria.

Purchased from T. Worcester.

Nucula (Ennucula) kalimnae Singleton, 1932.

See *Nucula kalimnae* Singleton, 1932.

Nuculana acuticauda (Pritchard, 1901).

See *Leda acuticauda* Pritchard, 1901.

Nuculana fontinalis (Pritchard, 1901).

See *Leda fontinalis* Pritchard, 1901.

Nuculana paucigradata Singleton, 1943.

Nuculana paucigradata F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 55 (2), p. 268, pl. 12, figs. 1*a*, *b*, October, 1943.

M.U.G.D. No. 1868. HOLOTYPE, left valve, figured by Singleton, loc. cit., 1943.

Eocene.

Second point north-west of Pebble Point, coastal cliffs 2½ miles south-east of Princetown, Victoria.

Coll. Jan., 1942, and pres. G. Baker, Jan., 1943.

Nuculana (Scaeoleda) killara Singleton, 1941.

Nuculana (Scaeoleda) killara F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 53 (2), p. 424, pl. 20, fig. 2, July, 1941.

M.U.G.D. No. 1673. HOLOTYPE, left valve, figured by Singleton, loc. cit., 1941.

Upper Pliocene (Werrikooian).

Glenelg River at "Roscoe's", Parish of Killara, Victoria.

Coll. 29.5.24, and pres. F. A. Singleton, 12.12.40.

Obs.—This specimen is missing. It was formerly No. 21 in F. A. Singleton's private collection.

Ostrea sinuata glenelgensis Singleton, 1941.

Ostrea sinuata glenelgensis F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 53 (2), p. 426, pl. 20, fig. 6, July, 1941.

M.U.G.D. No. 1676. SYNTYPE, figured by Singleton, loc. cit., 1941.

M.U.G.D. No. 1677. SYNTYPE, counterpart of No. 1676.

Upper Pliocene (Werrikooian).

Glenelg River, Allotment 16A, Parish of Werrikoo, Western Victoria.

Coll. 30.5.24, and pres. F. A. Singleton, 12.12.40.

Pecten asperrimus Lamarck, 1819.

See *Chlamys asperrimus asperrimus* (Lamarck, 1819).

Pinna cordata Pritchard, 1895.

Pinna cordata G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 7, p. 228, pl. 12, figs. 4, 5, January, 1895.

M.U.G.D. No. 1744. HOLOTYPE, paired valves, figured by Pritchard, loc. cit., 1895.

Miocene (Barwonian: probably Balcombian).

Sandy limestones, Barwon River, near its junction with the Native Hut Creek, Victoria.

Coll. J. Betheras. Purchased from Dr. G. B. Pritchard, 11.10.39.

Prolucina mitchelli (Pritchard, 1913).

See *Lucina (Prolucina) mitchelli* Pritchard, 1913.

Trigonia semiundulata Jenkins, 1865:—**Eotrigonia semiundulata** (Jenkins, 1865).

Trigonia subundulata M'Coy MS.: H. M. Jenkins, Quart. Journ. Sci., 2, p. 363, 1865 (*nomen nudum*).

Trigonia semiundulata M'Coy MS.: H. M. Jenkins, *ibid.*, pl. opp. p. 630, fig. 6, 1865.

Trigonia semiundulata F. M'Coy, Geol. Mag., 3, p. 481, 1866.

Trigonia semiundulata F. McCoy Prodromus Palaeont. Vic., decade 2, p. 22, pl. 19, figs. 4, 5, 1878.

Trigonia semiundulata McCoy: W. Bednall, Trans. Phil. Soc. Adelaide, for 1877-8, p. 81, 1878. R. Tate, Trans. Roy. Soc. S. Aust., 8, p. 145, 1886. R. M. Johnston, Geol. Tas., p. 235, pl. 29, fig. 5, 1888. R. Etheridge, jun., Rec. Geol. Surv. N.S. Wales, 3 (4), p 115, 1893.

Trigonia subundulata (M'Coy MS.) Jenkins: G. F. Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 352, 1897.

Trigonia semiundulata Jenkins: G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 91, pl. 15, figs. 3, 4, 1903. J. Marwick, Rept. Aust. Assoc. Adv. Sci., 16, p. 327, 1924.

Trigonia subundulata Jenkins: H. Suter, N.Z. Geol. Surv. Pal. Bull. 2, p. 39, pl. 4, fig. 5, 1914.

M.U.G.D. No. 1768. HYPOTYPE, right valve, figured by Pritchard, loc. cit., fig. 3, 1903.

M.U.G.D. No. 1769. HYPOTYPE, right valve, figured by Pritchard, loc. cit., fig. 4, 1903.

Miocene (Janjukian).

"Spring Creek series" (Pritchard, loc. cit., p. 103, 1903) = Lower Beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Trigonia semiundulata Jenkins var. **granosa** Pritchard, 1903:—**Eotrigonia semiundulata granosa** (Pritchard, 1903).

Trigonia semiundulata Jenkins, variety *granosa*, G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 92, pl. 15, fig. 5, February, 1903.

M.U.G.D. No. 1770. HOLOTYPE, right valve, figured by Pritchard, loc. cit., 1903.

Miocene (Janjukian).

"Lower beds of the Spring Creek series, or Bird Rock Bluff, near Geelong" (Pritchard, loc. cit., p. 92, 1903) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Trigonia semiundulata Jenkins var. **lutosa** Pritchard, 1903:—**Eotrigonia lutosa** (Pritchard, 1903).

Trigonia semiundulata Jenkins, variety *lutosa* G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 15 (2), p. 92, pl. 15, figs. 6, 7, February, 1903.

M.U.G.D. No. 1771. SYNTYPE, left valve, figured by Pritchard, loc. cit., fig. 6, 1903.

M.U.G.D. No. 1772. SYNTYPE, left valve, figured by Pritchard, loc. cit., fig. 7, 1903.

Miocene (Balcombian).

Lower Beds of Muddy Creek, Western Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Trigonia tatei Pritchard, 1895:—**Eotrigonia intersitans** (Tate, 1896).

Trigonia tatei G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 7, p. 225, pl. 12, figs. 1-3, January, 1895. G. F. Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 353, 1897. Not *Trigonia tatei* E. Holub and M. Neumayr, Denkschr. d. Math. Naturw. Cl. d. K. Akad. d. Wiss. Wien, 44, p. 275, pl. 2, fig. 3, 1881.

Trigonia tatei Pritchard: G. F. Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 353, 1897.

Trigonia intersitans R. Tate, nom. mut., in R. Tate and J. Dennant, Trans. Roy. Soc. S. Aust., 20 (1), p. 146 and footnote, September, 1896.

M.U.G.D. No. 1741. SYNTYPE, left valve, figured by Pritchard, loc. cit., figs. 1, 3, 1895.

M.U.G.D. No. 1742. SYNTYPE, right valve, figured by Pritchard. loc. cit., fig. 2, 1895.

M.U.G.D. No. 1743. SYNTYPE, right valve, unfigured.

Miocene (Janjukian?).

"Lower Eocene calcareous sands, Moorabool Valley, near Maude" (Pritchard, loc. cit., p. 226, 1895) = Lower beds, Maude, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Venericardia excrescens (Pritchard, 1903).

See *Cardita excrescens* Pritchard, 1903.

Venericardia maudensis (Pritchard, 1895).

See *Cardita maudensis* Pritchard, 1895.

Verticordia excavata Pritchard, 1901.

Verticordia excavata G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 30, August, 1901.

M.U.G.D. No. 1799. HOLOTYPE, right valve, unfigured.

Miocene (Balcombian).

"Eocene clays from near the Old Cement Works, Balcombe's Bay, Mornington" (Pritchard, loc. cit., p. 30, 1901), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

SCAPHOPODA.

Dentalium (Fissidentalium) gracilicostatum Singleton, 1943.

Dentalium (Fissidentalium) gracilicostatum F. A. Singleton, Proc. Roy. Soc. Vic., n.s., 55 (2), p. 275, pl. 12, figs. 6a, b; pl. 13, figs. 9a, b, October, 1943.

M.U.G.D. No. 1871. HOLOTYPES, figured by Singleton, loc. cit., 1943.

Eocene.

Bay between first and second points north-west of Pebble Point, coastal cliffs 2½ miles south-east of Princetown, Victoria.

Coll. Jan., 1942, and pres. G. Baker, Jan., 1943.

GASTEROPODA.

Apiotoma bassi Pritchard, 1904.

Apiotoma bassi G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 328, pl. 19, fig. 11, September, 1904. H. J. Finlay, Trans. N.Z. Inst., 56 (1), p. 252, 1926. A. W. B. Powell, Bull. Auck. Inst. Mus., 2, p. 65, 1942. A. W. B. Powell, Rec. Auck. Inst. Mus., 3 (1), p. 20, 1944.

M.U.G.D. No. 1825. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Miocene (Janjukian).

"Clays of the Cape Otway section, near Point Flinders" (Pritchard, loc. cit., p. 329, 1904). Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Apiotoma granti (Pritchard, 1904).

See *Pleurotoma granti* Pritchard, 1904.

Astele millegranosa Pritchard, 1904.

Astele millegranosa G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 332, pl. 19, figs. 7, 8, September, 1904.

M.U.G.D. No. 1828. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Miocene (Balcombian).

Lower beds, Muddy Creek, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Astralium (Imperator) johnstoni Pritchard, 1896:—**Imperator johnstoni** (Pritchard, 1896).

Astralium (Imperator) johnstoni G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 8, p. 116, April, 1896.

M.U.G.D. No. 1810. SYNTYPE, internal cast in two pieces (1810A and 1810B) which fit together, unfigured.

Miocene (Balcombian?)

"Royal Park" (Pritchard, loc. cit., p. 118, 1896) = Lower beds, Royal Park railway cutting, between Flemington and Royal Park stations, near Melbourne, Victoria.

Collected by Rev. M. Ramage (?). Purchased from Dr. G. B. Pritchard, 11.10.39.

M.U.G.D. No. 1811. SYNTYPE, external mould, unfigured.

M.U.G.D. No. 1812. SYNTYPE, internal cast (not a counterpart of preceding), unfigured.

Miocene (Balcombian?).

"Eocene ferruginous beds of Keilor" (Pritchard, loc. cit., p. 118, 1896) = Green Gully, near Keilor, Victoria.

Collected by T. S. Hart (?). Purchased from Dr. G. B. Pritchard, 11.10.39.

Obs.—In the synonymy cited by Pritchard is included *Imperator hudsoniana* R.M. Johnston, Geology of Tasmania, pl. 29, figs. 12, 12a, 1888, which would seem to be the valid name for the present species. Since Pritchard (loc. cit.) regards their identity as extremely doubtful and the two come from different geological horizons, Pritchard's name has been allowed to stand.

Aulica weldii (T. Woods, 1876).

See *Voluta weldii* T. Woods, 1876.

Aulica weldii angustior (Pritchard, 1913).

See *Voluta weldii* var. *angustior* Pritchard, 1913.

Aulica weldii intermedia (Pritchard, 1913).

See *Voluta weldii* var. *intermedia* Pritchard, 1913.

Austrolithes bulbodes (Tate, 1888).

See *Clavella bulbodes* (Tate, 1888).

Austrolithes platystropha (Pritchard, 1904).

See *Clavella platystropha* Pritchard, 1904.

Bankivia howitti Pritchard, 1903.

Bankivia howitti G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 334, pl. 18, fig. 1, September, 1904.

M.U.G.D. No. 1817. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Lower Pliocene (Kalimnan).

("Sandy clays of Jimmy's Point, Gippsland" (Pritchard, loc. cit., p. 334, 1904) = Jemmy's Point, Kalimna, Gippsland Lakes, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Cantharidus serratulus Pritchard, 1904.

Cantharidus serratulus G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 331, pl. 19, figs. 5, 6, September, 1904.

M.U.G.D. No. 1826. SYNTYPE, figured by Pritchard, loc. cit., fig. 5, 1904.

M.U.G.D. No. 1827. SYNTYPE, figured by Pritchard, loc. cit., fig. 6, 1904.

Miocene (Balcombian).

Lower beds, Muddy Creek, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Clavella bulbodes (Tate, 1888) :—**Austrolithes bulbodes** (Tate, 1888).

Fusus bulbodes R. Tate, Trans. Roy. Soc. S. Aust., 10, p. 139, pl. 7, fig. 8, 1888.
Clavilithes bulbodes R. Tate, Journ. Roy. Soc. N.S. Wales, 27, p. 170, 1894.
Clavella bulbodes Tate: G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 14 (1), p. 48, 1901. G. B. Pritchard, *ibid.*, 17 (1), p. 320, pl. 18, figs. 2, 3, 1904.

M.U.G.D. No. 1800. HYPOTYPE, figured by Pritchard, loc. cit., fig. 3, 1904.

M.U.G.D. No. 1801. HYPOTYPE, juvenile, figured by Pritchard, loc. cit., fig. 2, 1904.

Miocene (Balcombian).

"Clays of the Old Cement Works, Balcombe's Bay" (Pritchard, loc. cit., p. 322, 1904), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Clavella platystropha Pritchard, 1904: — **Austrolithes platystropha** (Pritchard, 1904).

Clavella platystropha G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 322, pl. 18, figs. 4, 5, September, 1904.

M.U.G.D. No. 1802. HOLOTYPE, figured by Pritchard, loc. cit., fig. 4, 1903.

M.U.G.D. No. 1803. PARATYPE, juvenile, figured by Pritchard, loc. cit., fig. 5, 1903.

Miocene (Balcombian).

"Lower Beds of Muddy Creek sections near Hamilton, Western Victoria" (Pritchard, loc. cit., p. 323, 1904).

Purchased from Dr. G. B. Pritchard, 11.10.39.

Collonia geelongensis Pritchard, 1904.

Collonia geelongensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 330, pl. 18, figs. 8, 9, September, 1904.

M.U.G.D. No. 1819. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Miocene (Balcombian).

"Clays over Polyzoal Rock, Filter Quarries, Batesford, near Geelong" (Pritchard, loc. cit., p. 330, 1904), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Collonia otwayensis Pritchard, 1904.

Collonia otwayensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 331, pl. 18, figs. 6, 7, September, 1904.

M.U.G.D. No. 1818. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Miocene (Janjukian).

"Clays and sandy clays of the Cape Otway section near Point Flinders" (Pritchard, loc. cit., p. 331, 1904), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Columbella approximans Pritchard, 1904.

Columbella approximans G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 325, pl. 18, figs. 12, 13, September, 1904.

M.U.G.D. No. 1821. HOLOTYPE, figured by Pritchard, loc. cit,, 1904.

Miocene (Balcombian).

"Clays of the Old Cement Works, Balcombe's Bay, Mornington" (Pritchard, loc. cit., p. 325, 1904), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Columbella balcombensis Pritchard, 1904.

Columbella clathrata R. Tate MS.

Columbella balcombensis G. B. Pritchard, Proc. Roy. Soc Vic., n.s., 17 (1), p. 324, pl 18, figs. 10, 11, September, 1904.

M.U.G.D. No. 1820. HOLOTYPE, figured by Pritchard, loc, cit., 1904.

Miocene (Balcombian).

"Clays of the Old Cement Works, Balcombe's Bay" (Pritchard, loc. cit., p. 324, 1904), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Epideira selwyni (Pritchard, 1904).

See *Pleurotoma selwyni* Pritchard, 1904.

Epideira selwyni suppressa Finlay, 1927.

See *Pleurotoma selwyni* var. *laevis* Pritchard, 1904.

Ericusa fulgetroides (Pritchard, 1898).

See *Voluta fulgetroides* Pritchard, 1898.

Eutrochus fontinalis Pritchard, 1904.

Eutrochus fontinalis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 333, pl. 19, fig. 9, September, 1904.

M.U.G.D. No. 1816. HOLOTYPE (imperfect), figured by Pritchard, loc. cit., 1904.

Miocene (Janjukian).

"Lower beds of the Spring Creek series, or Bird Rock Bluff, near Geelong" (Pritchard, loc. cit., p. 334, 1904) = Lower beds, Bird Rock cliffs, near Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Imperator johnstoni (Pritchard, 1896).

See *Astralium (Imperator) johnstoni* Pritchard, 1896.

Latirofusus cingulata Pritchard, 1896.

Latirofusus cingulata G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 8, p. 83, pl. 2, figs. 5, 6, April, 1896.

M.U.G.D. No. 1814. HOLOTYPE, figured by Pritchard, loc. cit., 1896.

Miocene (Janjukian).

"Lower beds of the lower eocene series of Spring Creek, near Geelong, Victoria" (Pritchard, loc. cit., p. 84, 1896) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Lophiotoma murrayana (Pritchard, 1904).

See *Pleurotoma murrayana* Pritchard, 1904.

Murex wallacei Pritchard, 1898.

Murex wallacei G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 11 (1), p. 104, pl. 7, fig. 3, September, 1898.

M.U.G.D. No. 1831. HOLOTYPE, figured by Pritchard, loc. cit., 1898.

Miocene (Balcombian).

"Eocene clays of Mornington" (Pritchard, loc. cit., p. 105, 1898).

Coll. W. Wallace. Purchased from Dr. G. B. Pritchard, 11.10.39.

Niso kimberi Pritchard, 1906.

Niso kimberi G. B. Pritchard, Vic. Naturalist, 23 (6), p. 119, 4th October, 1906.

M.U.G.D. No. 1873. HOLOTYPE, unfigured.

Miocene (Janjukian).

"Lower beds of the Aldinga series, South Australia" (Pritchard, loc. cit., p. 119, 1903) = Lower beds, Aldinga Bay, South Australia.

Coll. W. J. Kimber. Purchased from Dr. G. B. Pritchard, 11.10.39.

Notopeplum liratum (Johnston, 1880).

See *Voluta lirata* Johnston, 1880.

Pleurotoma granti Pritchard, 1904:—**Apiotoma granti** (Pritchard, 1904).

Pleurotoma granti G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 336, pl. 19, fig. 3, September, 1904.

Apiotoma granti Pritchard: A. W. B. Powell, Bull. Auck. Inst. Mus., 2, p. 65, 1942 [as *Pleurotoma granti* Pritchard]. A. W. B. Powell, Rec. Auck. Inst. Mus., 3 (1), p. 21, 1944.

M.U.G.D. No. 1807. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Miocene (Balcombian).

Lower beds, Muddy Creek, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Pleurotoma murrayana Pritchard, 1904:—**Lophiotoma murrayana** (Pritchard, 1904).

Pleurotoma murrayana G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 335, pl. 19, fig. 10, September, 1904.

Lophiotoma murrayana (Pritchard, 1904): A. W. B. Powell, Rec. Auck. Inst. Mus., 3 (1), p. 9, 1944.

M.U.G.D. No. 1824. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Miocene (Barwonian; probably Balcombian).

"River Murray Cliffs, near Morgan" (Pritchard, loc. cit., p. 336, 1904), South Australia. The label on the original box states "River Murray Cliffs near Mannum", which is evidently a *lapsus*.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Pleurotoma selwyni Pritchard, 1904:—**Epideira selwyni** (Pritchard, 1904).

Pleurotoma selwyni G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 326, pl. 19, fig. 1, September, 1904.

Turris selwyni (Pritchard, 1904): A. W. B. Powell, Rec. Auck. Inst. Mus., 3 (1), p. 8, 1944.

M.U.G.D. No. 1822. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Miocene (Balcombian).

Lower beds of Muddy Creek, near Hamilton, Western Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Pleurotoma selwyni var. **laevis** Pritchard, 1904:—**Epideira selwyni suppressa** Finlay, 1927.

Pleurotoma selwyni variety *laevis* G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 328, pl. 19, fig. 2, September, 1904. Not *Pleurotoma laevis* Bellardi, M. R. Acc. Sci. Torino, [2] 9, p. 542, 1848. Nor *Pleurotoma laevis* F. W. Hutton, Cat. Marine Moll. N.Z., p. 12, 1873 (= *Splendrillia aoteana* H. J. Finlay, nom. nov., Trans. N.Z. Inst., 61 (1), p. 47, 1930).

Epideira selwyni suppressa H. J. Finlay, nom. nov., Trans. N.Z. Inst., 57, p. 516, 19th January, 1927.

Epidirona suppressa (Finlay, 1927): A. W. B. Powell, Rec. Auck. Inst. Mus., 3 (1), p. 16, 1944.

M.U.G.D. No. 1823. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Miocene (Balcombian).

Lower beds of Muddy Creek, near Hamilton, Western Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Obs.—Finlay, loc. cit., 1927, cites as another homonym *Pleurotoma laevis* Bell, 1890, for which he provides *Raphitoma belliana*, nom. nov. But at the reference cited (Rept. Brit. Assoc. Adv. Sci. 60th Meeting (Leeds, 1890), p. 410, 1891) A. Bell includes in a list *Pleurotoma laevis* (n. sp.), which is a *nomen nudum*, next appearing in the synonymy of *Raphitoma laevis* (A. Bell) F. W. Harmer, Plioc. Moll. Gt. Britain, 2 (1), Palaeontogr. Soc., Lond., 72, for 1918, p. 523, pl. 47, fig. 10, December, 1920. This latter combination, which must be cited as *Raphitoma laevis* Harmer, 1922, does not clash with *Pleurotoma laevis* and therefore *Raphitoma belliana* Finlay, 1927, falls in its synonymy.

Pleurotomaria bassi Pritchard, 1903.

Pleurotomaria bassi Pritchard, Proc. Roy. Soc. Vic., n.s., 16 (1), p. 85, pl. 13, figs. 1, 2, September, 1903.

M.U.G.D. No. 1797. HOLOTYPE, figured by Pritchard, loc. cit., 1903.

Miocene (Janjukian).

" Basal horizon of the Table Cape Beds, Tasmania, in coarse ferruginous grits " Pritchard, loc. cit., p. 86, 1903).

Purchased from Dr. G. B. Pritchard, 11.10.39.

Pleurotomaria tertiaria McCoy, 1876.

Pleurotomaria Tertiaria F. McCoy, Prodromus Palaeont. Vic., decade 3, p. 23, pl. 25, figs. 1, 1*a*, 1*b*, 1876.

Pleurotomaria tertiaria McCoy: G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 16 (1), p. 83, pl. 14, figs. 1-4, 1903.

M.U.G.D. No. 1798. HYPOTYPE, figured by Pritchard, loc. cit., figs. 1-3, 1903.

Miocene (Barwonian, probably Balcombian).

" ? Corio Bay or Lower Moorabool Valley " (Pritchard, loc. cit., p. 91, 1903) Victoria. The specimen (No. 1798) when received from Dr. Pritchard was in a box marked " OAH. Geelong ", which refers to Orphanage Hill, Fyansford, near Geelong, Victoria, a locality in the Lower Moorabool Valley.

Coll. Rev. A. W. Cresswell. Purchased from Dr. G. B. Pritchard, 11.10.39.

Pterospira gatliffi (Pritchard, 1898).

See *Voluta gatliffi* Pritchard, 1898.

Pterospira stephensi (Johnston, 1880).

See *Voluta stephensi* Johnston, 1880.

Solutofusus carinatus Pritchard, 1898.

Solutofusus carinatus G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 11 (1), p. 102, pl. 7, figs. 1, 1*a*, 2, September, 1898.

M.U.G.D. No. 1829. HOLOTYPE, figured by Pritchard, loc. cit., figs. 1, 1*a*, 1898.

M.U.G.D. No. 1830. PARATYPE, figured by Pritchard, loc. cit., fig. 2, 1898.

Miocene (Balcombian).

" Eocene clays of Balcombe's Bay, Mornington " (Pritchard, loc. cit., p. 103, 1898), Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Tentaculites matlockiensis Chapman, 1904.

Tentaculites matlockiensis F. Chapman, Proc. Roy. Soc. Vic., n.s., 16 (2), p. 338, pl. 31, figs. 1-3, 5, March, 1904. E. D. Gill, *ibid.*, 53 (1), p. 150, pl. 4, figs. 4, 5, 1941.

M.U.G.D. No. 1734. HYPOTYPE, internal cast, figured by Gill, loc. cit., fig. 4, 1941.

M.U.G.D. No. 1735. COUNTERPART OF HYPOTYPE, external mould (counterpart of No. 1734), unfigured.

"Silurian (Jordanian)" (Gill, loc. cit., p. 161, 1941) = Upper Silurian (Tanjilian).

Cutting on west bank of Muddy Creek (near McMahon's Creek) on south side of Warburton-Wood's Point Road, Victoria.

Presented by Rev. E. D. Gill, 24.5.41.

Tremanotus pritchardi Cresswell, 1893: — **Trematonotus pritchardi** (Cresswell, 1893).

Tremanotus [*sic*] *pritchardi* A. W. Cresswell, Proc. Roy. Soc. Vic., n.s., 5, p. 42 and addenda slip opposite p. 38, pl. 8, fig. 1 (3 figs.), May, 1893.

M.U.G.D. No. 1666. HOLOTYPE, figured by Cresswell, loc. cit., 1893.

M.U.G.D. No. 1667. COUNTERPART OF HOLOTYPE, part of external mould, unfigured.

Lower Devonian (Yeringian).

Cave Hill Quarry, Lilydale, Victoria. The type material is stated by Dr. Pritchard (personal communication, 1939) to be from the south face of the quarry (Mitchell's quarry).

Purchased from Dr. G. B. Pritchard, 11.10.39.

Trematonotus pritchardi (Cresswell, 1893).

See *Tremanotus pritchardi* Cresswell, 1893.

Trophon selwyni Pritchard, 1896.

Trophon selwyni G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 8, p. 79, pl. 2, fig. 7, April, 1896.

M.U.G.D. No. 1815. HOLOTYPE, figured by Pritchard, loc. cit., 1896.

Miocene (Janjukian).

"Lower beds of the lower eocene of Spring Creek, near Geelong, Victoria" (Pritchard, loc. cit., p. 81, 1896) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Turbo hamiltonensis Pritchard, 1904:—**Turbo (Subninella) grangensis** Pritchard, 1906.

Turbo paucigranosa R. Tate MS.: J. Dennant, Trans. Roy. Soc. S. Aust., 11, p. 48, 1889 (list name).

Turbo hamiltonensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 17 (1), p. 329, pl. 19, fig. 4, September, 1904. Not *Turbo hamiltonensis* G. F. Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 274, pl. 8, fig. 3a-c, 1897.

Turbo grangensis G. B. Pritchard, nom. mut., Vic. Naturalist, 23 (6), p. 117, 4th October, 1906. F. Chapman, Proc. Roy. Soc. Vic., n.s., 35 (1), p. 10, pl. 2, figs. 13, 14, 1922.

M.U.G.D. No. 1808. HOLOTYPE, figured by Pritchard, loc. cit., 1904.

Lower Pliocene (Kalimnan).

"Upper beds of the Grange Burn, near Hamilton, Western Victoria" (Pritchard, loc. cit., p. 330, 1904).

Purchased from Dr. G. B. Pritchard, 11.10.39.

Turbo (Subninella) grangensis Pritchard, 1906.

See *Turbo hamiltonensis* Pritchard, 1904.

Voluta fulgetroides Pritchard, 1898:—**Ericusa fulgetroides** (Pritchard, 1898).

Voluta fulgetroides G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 11 (1), p. 105, pl. 7, fig. 4, September, 1898.

M.U.G.D. No. 1804. HOLOTYPE, figured by Pritchard, loc. cit., 1898.

Lower Pliocene (Kalimnan).

"Miocene beds of Muddy Creek" (Pritchard, loc. cit., p. 106, 1898) = Upper beds, Muddy Creek, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Voluta gatliffi Pritchard, 1898:—**Pterospira gatliffi** (Pritchard, 1898).

Voluta gatliffi G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 11 (1), p. 108, pl. 8, fig. 6, September, 1898.

M.U.G.D. No. 1805. HOLOTYPE, figured by Pritchard, loc. cit., 1898.

Miocene (Balcombian).

"Eocene beds of Muddy Creek, Western Victoria" (Pritchard, loc. cit., p. 109, 1898) = Lower beds, Muddy Creek, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Voluta halli Pritchard, 1896.

Voluta halli G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 8, p. 101, pl. 2, figs. 1-3, April, 1896. G. B. Pritchard, *ibid.*, 26 (1), p. 198, 1913.

M.U.G.D. No. 1789. HOLOTYPE, figured by Pritchard, loc. cit., fig. 1, 1896.

Miocene (Janjukian).

"Lower Eocene beds at Spring Creek, near Geelong" (Pritchard, loc. cit., p. 102, 1896) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

M.U.G.D. No. 1790. PARATYPE, juvenile, figured by Pritchard, loc. cit., fig. 2, 1898.

M.U.G.D. No. 1791. PARATYPE, juvenile, figured by Pritchard, loc. cit., fig. 3, 1898.

Miocene (Balcombian).

"Eocene clays of Curlewis, Bellarine Peninsula, Victoria" (Pritchard, loc. cit., p. 102, 1896).

Purchased from Dr. G. B. Pritchard, 11.10.39.

Voluta hamiltonensis Pritchard, 1898.

Voluta hamiltonensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 11 (1), p. 107, pl. 8, fig. 5, September, 1898.

M.U.G.D. No. 1832. HOLOTYPE, figured by Pritchard, loc. cit., 1898.

Miocene (Balcombian).

"Eocene beds of Muddy Creek, Western Victoria" (Pritchard, loc. cit., p. 108, 1898) = Lower beds, Muddy Creek, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Voluta lirata Johnston, 1880:—**Notopeplum liratum** (Johnston, 1880).

"*Voluta lirata* R. M. Johnston," Pap. Roy. Soc. Tas. for 1879, p. 37, 1880. Not *Voluta lirata* Johnston: R. Tate, Trans. Roy. Soc. S. Aust., 11, p. 130, pl. 2, fig. 4, 1889; nor G. F. Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 103, pl. 4, fig. 12, 1897 (= *V. costellifera* Tate, var.).

Voluta allporti R. M. Johnston, Geol. Tas., pl. 30, fig. 10, 1888. Not *Voluta allporti* R. M. Johnston, Pap. Roy. Soc. Tas. for 1879, p. 35, 1880.

Voluta lirata Johnston: G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 26 (1), p. 197, pl. 20, figs. 7, 8, 1913.

M.U.G.D. No. 1795. Hypotype, figured by Pritchard, loc. cit., 1913.

Miocene (Janjukian).

"Table Cape Beds, Tasmania" (Pritchard, loc. cit., p. 192, 1913) = Table Cape, near Wynyard, Tasmania. The "Table Cape" beds are actually at the Fossil Bluff, west of the mouth of the Inglis River at Wynyard. The colour and matrix suggest the lower or "Crassatella" bed at this locality.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Voluta pueblensis Pritchard, 1898.

Voluta pueblensis G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 11 (1), p. 109, pl. 8, fig. 7, September, 1898.

M.U.G.D. No. 1806. Holotype, figured by Pritchard, loc. cit., 1898.

Miocene (Janjukian).

"Lower horizon of the Eocene beds of Spring Creek, south of Geelong" (Pritchard, loc. cit., p. 110, 1898. Erroneously given as "Muddy Creek" on explanation to plate, p. 111, 1898) = Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Voluta spenceri Pritchard, 1896.

Voluta spenceri G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 8, p. 98, pl. 4, figs. 1, 2, April, 1896. G. B. Pritchard, *ibid.*, 26 (1), p. 198, 1913.

M.U.G.D. No. 1813. Paratype, imperfect apical portion, figured by Pritchard, loc. cit., fig. 2, 1896.

Miocene (Balcombian).

"Eocene clays of Curlewis, Bellarine Peninsula, Victoria."

Purchased from Dr. G. B. Pritchard, 11.10.39.

Voluta stephensi Johnston, 1880:—**Pterospira stephensi** (Johnston, 1880).

Voluta stephensi R. M. Johnston, Pap. Roy. Soc. Tas. for 1879, p. 35, 1880. G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 8, p. 94, 1896. G. B. Pritchard, *ibid.*, 26 (1), p. 195, pl. 21, figs. 3, 4, September, 1913.

M.U.G.D. No. 1796. Hypotype, figured by Pritchard, *loc. cit.*, 1913.

Miocene (Janjukian).

"Table Cape Beds, Tasmania" (Pritchard, loc. cit., p. 192, 1913) = Table Cape, near Wynyard, Tasmania. Colour and matrix definitely allocate it to the lower or "Crassatella" bed at this, the type locality.

Voluta weldii T. Woods, 1876:—**Aulica weldii** (T. Woods, 1876).

Voluta Weldii J. E. T. Woods, Pap. Roy. Soc. Tas. for 1875, p. 24, pl. 1, fig. 2, 1876. R. M. Johnston, Geol. Tas., pl. 30, figs. 6-6*b* (*non* fig. 7), 1888. R. Tate, Trans. Roy. Soc. S. Aust., 11, p. 134, 1889. G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 8, p. 93, 1896.

Voluta (Aulica) weldi T. Woods: G. F. Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 102, 1897.

Voluta (Aulica) Weldii T. Woods: R. Tate, Journ. Roy. Soc. N.S. Wales, 31, p. 386, 1898.

Voluta weldii T. Woods: G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 26 (1), p. 193, pl. 20, fig. 1, 1913.

M.U.G.D. No. 1792. HYPOTYPE, figured by Pritchard, loc. cit., 1913.

Miocene (Janjukian).

"Table Cape Beds, Tasmania" (Pritchard, loc. cit., p. 192, 1913) = Table Cape, near Wynyard, Tasmania. The matrix suggests the upper or Turritella bed at this, the type locality.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Voluta weldii var. **angustior** Pritchard, 1913:—**Aulica weldii angustior** (Pritchard, 1913).

Voluta weldii variety *angustior* G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 26 (1), p. 194, pl. 20, figs. 4, 5. September, 1913.

M.U.G.D. No. 1794. HOLOTYPE, figured by Pritchard, loc. cit., 1913.

"Table Cape Beds, Tasmania" (Pritchard, loc. cit., p. 192, 1913) = Table Cape, near Wynyard, Tasmania. Colour and matrix suggest the lower or "Crassatella" bed at this locality.

Voluta weldii var. **intermedia** Pritchard, 1913:—**Aulica weldii intermedia** (Pritchard, 1913).

Voluta weldii variety *intermedia* G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 26 (1), p. 193, pl. 20, figs. 2, 3, September, 1913.

M.U.G.D. No. 1793. HOLOTYPE, figured by Pritchard, loc. cit., 1913.

Miocene (Balcombian).

Lower beds, Muddy Creek, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

CEPHALOPODA.

Aturoidea distans Teichert, 1943.

Aturoidea distans C. Teichert, Proc. Roy. Soc. Vic., n.s., 55 (2), p. 260, text fig. 1, pl. 11, figs. 1-4, October, 1943.

M.U.G.D. No. 1860. HOLOTYPE, figured by Teichert, loc. cit., text fig. 1, pl. 11, fig. 1, 1943.

M.U.G.D. No. 1861. PARATYPE, figured by Teichert, loc. cit., pl. 11, figs. 2, 3, 1943.

M.U.G.D. No. 1862. PARATYPE, figured by Teichert, loc. cit., pl. 11, fig. 4, 1943.

Eocene.

Grit band 30-40 feet above Jurassic-Tertiary unconformity, second point north-west of Pebble Point, south-east of Princetown, Victoria.

Coll. Jan., 1942, and pres. G. Baker, Jan., 1943.

Nautilus geelongensis Foord, 1891.

Nautilus geelongensis A. H. Foord, Cat. Foss. Cephal. Brit. Mus., pt. 2, p. 332, figs. 69 *a-c* (woodcut), 1891. F. Chapman, Proc. Roy. Soc. Vic., n.s., 27 (2), p. 354, pl. 4, figs. 7-9, 1915. C. Teichert, *ibid.*, 55 (2), p. 263, text fig. 4 (p. 262), 1943.

M.U.G.D. No. 1863. HYPOTYPE, suture figured by Teichert, loc. cit., 1943.

Upper Miocene (Cheltenhamian).

"Cheltenham" = Upper beds, Beaumaris, Victoria. The specimen is an internal cast in brown sandstone.

Purchased from T. Worcester.

Nautilus victorianus Teichert, 1943.

Nautilus victorianus C. Teichert, Proc. Roy. Soc. Vic., n.s., 55 (2), p. 262, text fig. 2, pl. 11, figs. 5-7, October, 1943.

M.U.G.D. No. 1864. HOLOTYPE, figured by Teichert, loc. cit., 1943.

Eocene.

Grit band 30-40 feet above Jurassic-Tertiary unconformity, second point north-west of Pebble Point, south-east of Princetown, Victoria.

Coll. Jan., 1942, and pres. G. Baker, Jan., 1943.

Tetrabelus macgregori Glaessner, 1945.

Tetrabelus magregori M. F. Glaessner, Proc. Roy. Soc. Vic., n.s., 56 (2), p. 160, pl. 6, figs. 12*a*, *b*, 1945.

M.U.G.D. No. 1876. HOLOTYPE, figured by Glaessner, *loc cit.*, 1945.

Cretaceous (Purari Formation: Aptian-Albian).

Paw Creek, Purari River, Papua.

Coll. S. W. Carey and pres. M. F. Glaessner, 29.9.44.

CIRRIPEDIA.

Lepas pritchardi T. S. Hall, 1902.

Lepas pritchardi T. S. Hall, Proc. Roy. Soc. Vic., n.s., 15 (1), p. 83, pl. 11, figs. 11-13, August, 1902.

M.U.G.D. No. 1809. PARATYPE (?), unfigured.

Miocene (Janjukian).

"Spring Creek" (Hall, loc. cit., p. 84, 1902) = Bird Rock Cliffs, near Spring Creek, Torquay, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Obs.—This specimen is mentioned by Hall in his original description but it is not specifically stated to be a supplementary type. The "type" (i.e., holotype) is from Waurn Ponds and is now in the National Museum, Melbourne.

PHYLLOCARIDA.

Hymenocaris ornata Sherrard, 1930.

Hymenocaris ornata K. Sherrard, Proc. Roy. Soc. Vic., n.s., 42 (2), p. 136, pl. 11, figs. 1-3, 13th March, 1930.

M.U.G.D. No. 993. HOLOTYPE, figured by Sherrard, loc. cit., 1930.

M.U.G.D. No. 994. COUNTERPART OF HOLOTYPE No. 993.

Lower Ordovician (Lancefieldian, Zone La 2).

Quarry, Allot. 56, Parish of Goldie, near Lancefield, Victoria.

Coll. Sept., 1923 and pres. Mrs. K. Sherrard, 12.12.29.

MEROSTOMATA.

Hemiaspis tunnecliffei Chapman, 1932.

Hemiaspis tunnecliffei F. Chapman, Proc. Roy. Soc. Vic., n.s., 44 (1), p. 102, pl. 14, figs. 4, 5, 29th February, 1932.

M.U.G.D. No. 1201. HOLOTYPE, figured by Chapman, loc. cit., 1932, where the register number is erroneously stated to be 1801.

Upper Silurian (Melbournian).

"Road Cutting, Studley Park, Kew, Melbourne, Victoria" (Chapman, loc. cit., 1932). In the Register of Fossils in Melbourne University Geology Department, the locality is given as "Track to Pumping Station (? Monograptus bed), near Johnston Street Bridge, Studley Park, Victoria."

Presented by Master T. Tunnecliffe, jun., 8.7.31.

PISCES.

Antiarchan fish, ?genus.

Antiarchan, genus indet., E. S. Hills, Proc. Roy. Soc. Vic., n.s., 48 (2), p. 163, text-fig. 3, 1st June, 1936.

M.U.G.D. No. 1590. FIGURED PLASTER CAST, posterior median dorsal plate, figured by Hills, loc. cit., 1936.

Middle Devonian.

Gilberton District, Queensland.

Presented (plaster cast) by Dr. F. W. Whitehouse, 1935, the original being in his possession.

Bothriolepis gippslandiensis Hills, 1929.

Bothriolepis gippslandiensis E. S. Hills, Proc. Roy. Soc. Vic., n.s., 41 (2), p. 195, text fig. 2, No. 4 (p. 196), pl. 18, fig. 8, April, 1929. E. S. Hills, Geol Mag., 68 (5), p. 214, text figs. 5 (p. 215), 6, Nos. 1-3 (p. 218), 7, Nos. 1, 3 (p. 220), May, 1931.

M.U.G.D. No. 776. HOLOTYPE, specimen C.B., median occipital plate, figured by Hills, loc. cit., pl. 18, fig. 8, 1929.

M.U.G.D. No. 789. PARATYPE, specimen C.L., external marginal plate, figured by Hills, loc. cit., text fig. 2, No. 6, 1929.

M.U.G.D. No. 1882. HYPOTYPE, specimen T22*a*, anterior ventro-lateral plate, figured by Hills, loc. cit., pl. 11, fig. 5, 1931.

M.U.G.D. No. 1883. COUNTERPART OF HYPOTYPE No. 1882.

M.U.G.D. No. 1884. HYPOTYPE, specimen T10*b*, pectoral appendage, figured by Hills, loc. cit., pl. 11, fig. 2, 1931.

M.U.G.D. No. 1885. COUNTERPART OF HYPOTYPE No. 1884.

M.U.G.D. No. 1886. HYPOTYPE, specimen T28*a*, left posterior dorso-lateral plate, figured by Hills, loc. cit., pl. 11, fig. 3, 1931.

M.U.G.D. No. 1887. HYPOTYPE, specimen T37*a*, anterior median dorsal plate, figured by Hills, loc. cit., pl. 11, fig. 6, 1931.

M.U.G.D. No. 1888. HYPOTYPE, specimen T38*a*, anterior median dorsal plate, figured by Hills, loc. cit., pl. 11, fig. 4, 1931.

M.U.G.D. No. 1889. COUNTERPART OF HYPOTYPE No. 1888.

M.U.G.D No. 1890 COUNTERPART OF HYPOTYPE No. 1889.

M.U.G.D. No. 1891. HYPOTYPE, specimen T36*a*, anterior median dorsal plate, figured (as median section) by Hills, loc. cit., text fig. 7, No. 1, 1931.

M.U.G.D. No. 1892. COUNTERPART OF HYPOTYPE No. 1887.

M.U.G.D. No. 1893. PLASTER CAST of counterpart No. 1892.

M.U.G.D. No. 1894. HYPOTYPE, specimen T8*a*, median occipital plate, and COUNTERPART (No. 1895), specimen T8*b*, described by Hills, loc. cit., pp. 217-8, 1931.

M.U.G.D. No. 1896. HYPOTYPE, specimen 1A, premedian plate, upper surface, and COUNTERPART (No. 1897), specimen 1B, lower surface, described by Hills, loc. cit., pp. 218-9, 1931.

M.U.G.D. No. 1898. HYPOTYPE, incomplete posterior median dorsal plate, described by Hills, loc. cit., p. 221, 1931, and anterior median dorsal plate.

M.U.G.D. No. 1899. HYPOTYPE, specimen T27*a*, posterior dorso-lateral plate, upper surface, and COUNTERPART (No. 1900), specimen T 27*b*, lower surface, described by Hills, loc. cit., p. 221, 1931.

M.U.G.D. No. 1901. HYPOTYPE, specimen T34*a*, anterior dorso-lateral plate, upper surface, and COUNTERPART (No. 1902), specimen T34*b*, lower surface, described by Hills, loc. cit., p. 221, 1931.

M.U.G.D. No. 1903. HYPOTYPE, specimen T34*c*, posterior ventro-lateral plate, upper surface, described by Hills, loc. cit., p. 221, 1931.

M.U.G.D. No. 1904. HYPOTYPE, specimen T26*a*, median ventral plate, upper surface, and COUNTERPART (No. 1905), specimen T26*b*, lower surface, described by Hills, loc. cit., p. 221, 1931.

M.U.G.D. No. 1906. HYPOTYPE, specimen T16*a*, brachial plates, upper surface, and COUNTERPART (No. 1907), specimen T16*b*, lower surface, described by Hills, loc. cit., pp. 221-2, 1931.

Upper Devonian.

Blue Hills, near Taggerty, Victoria.

Coll. and pres. E. S. Hills, 20.2.29.

Bothriolepis sp.

Bothriolepis sp.: E. S. Hills, Proc. Roy. Soc. Vic., n.s., 48 (2), p. 165, text fig. 5, pl. 12 (p. 170), fig. 3, June, 1936.

M.U.G.D. No. 1588. FIGURED SPECIMEN, right pectoral fin, figured by Hills, loc. cit., pl. 12, fig. 3, 1936.

M.U.G.D. No. 1589. FIGURED SPECIMEN, ventro-lateral plate, figured by Hills, loc. cit., text fig. 5, 1936.

Upper Devonian.

Allotment 75A, Parish of Loyola, South Blue Range, near Mansfield, Victoria.

Coll. H. B. Hauser, 1933.

Diodon connewarrensis Chapman and Pritchard, 1907.

Diodon connewarrensis F. Chapman and G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 20 (1), p. 69, pl. 8, figs. 8-10, August, 1907. F. Chapman and F. A. Cudmore, *ibid.*, 36 (2), p. 147, 1924.

M.U.G.D. No. 1838. HOLOTYPE, spine, figured by Chapman and Pritchard, loc. cit., 1907.

Miocene (Balcombian).

Point Campbell clays, Lake Connewarre, near Geelong, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Diodon formosus Chapman and Pritchard, 1907.

Diodon formosus F. Chapman and G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 20 (1), p. 66, pl. 6, figs. 1-3; pl. 7; pl. 8, figs. 1-7, August, 1907. F. Chapman, Australasian Fossils, pp. 270, 271, fig. 131*f*, 1914. F. Chapman and F. A. Cudmore, Proc. Roy. Soc. Vic., n.s., 36 (2), p. 146, 1922.

M.U.G.D. No. 1837. PARATYPE, jaw of young example, figured by Chapman and Pritchard, loc. cit., pl. 8, fig. 4, 1907.

Upper Miocene (Cheltenhamian) [Beaumaris] or Lower Pliocene (Kalimnan) [Grange Burn].

Beaumaris, Port Phillip, Victoria (*fide* paper label with specimen, in Chapman's pencilled writing). Explanation to plate states fig. 4 (of which this is undoubtedly the original) to be from Grange Burn. The black colour of the specimen favours Grange Burn but is not decisive.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Dipterus microsoma (Hills, 1929).

See *Eoctenodus microsoma* Hills, 1929.

Edaphodon sweeti Chapman and Pritchard, 1907.

Edaphodon sweeti F. Chapman and G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 20 (1), p. 61, pl. 5, figs. 4-6, August, 1907. F. Chapman and F. A. Cudmore, *ibid.*, 36 (2), p. 141, pl. 11, figs. 38. 39, 1924.

M.U.G.D. No. 1834. SYNTYPE, left palatine tooth, figured by Chapman and Pritchard, loc. cit., fig. 6, 1907.

Upper Miocene (Cheltenhamian).

Beaumaris, Port Phillip, Victoria. Though not so labelled, it is almost certainly from the nodule bed at the base of the cliffs.

Purchased from Dr. G. B. Pritchard, 11.10.39.

M.U.G.D. No. 1835. SYNTYPE, right vomerine tooth, figured by Chapman and Pritchard, loc. cit., fig. 5, 1907.

Lower Pliocene (Kalimnan).

Grange Burn, near Hamilton, Victoria.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Eoctenodus microsoma Hills, 1929:—**Dipterus microsoma** (Hills, 1929).

Eoctenodus microsoma E. S. Hills, Proc. Roy. Soc. Vic., n.s., 41 (2), p. 193, text fig. 2, Nos. 1-3, 5, 6 (p. 196), pl. 18, figs. 2-7, April, 1929.
Dipterus microsoma (Hills, 1929): E. S. Hills, Geol. Mag., 68 (5), p. 222, May, 1931.

M.U.G.D. No. 773. HOLOTYPE, specimen JFA, parasphenoid, figured by Hills, loc. cit., text fig. 2, No. 5, pl. 18, fig. 5, 1929. Associated is a scale, also figured on pl. 18, fig. 5.

M.U.G.D. No. 770. PARATYPE, specimen C. XVII. *a*, left dentary of young, figured by Hills, loc. cit., pl. 18, fig. 2, 1929.

M.U.G.D. No. 771. PARATYPE, scale, figured by Hills, loc. cit., pl. 18, fig. 3, 1929.

M.U.G.D. No. 772. PARATYPE, specimen C. XVIII. *a*, left cleithrum, figured by Hills, loc. cit., text fig. 2, No. 6, pl. 18, fig. 4, 1929.

M.U.G.D. No. 774. PARATYPE, specimen JC, scale, figured by Hills, loc. cit., pl. 18, fig. 6, 1929.

M.U.G.D. No. 775. PARATYPE, specimen JA, left dentary, figured by Hills, loc. cit., text fig. 2, No. 1, pl. 18, fig. 7, 1929.

M.U.G.D No. 780. PARATYPE, counterpart of paratype No. 771.

M.U.G.D. No. 781. PARATYPE, specimen C. XVIII. *b*, counterpart of paratype No. 772.

M.U.G.D. No. 782. PARATYPE, specimen JF, counterpart of holotype No. 773.

M.U.G.D. No. 783. PARATYPE, specimen C iv, counterpart of paratype No. 774.

M.U.G.D. No. 784. PARATYPE, specimen JB1, left dentary.

M.U.G.D. No. 785. PARATYPE, specimen C.MO1, median occipital, figured by Hills, loc. cit., text fig. 2, No. 2, 1929.

M.U.G.D. No. 786. PARATYPE, specimen C.MO2, counterpart of paratype No. 785.

M.U.G.D. No. 787. PARATYPE, specimen JE3, counterpart of paratype No. 784.

M.U.G.D. No. 788. PARATYPE, specimen C.C., clavicle, figured by Hills, loc. cit., text fig. 2, No. 3, 1929.

M.U.G.D. No. 1736. PARATYPE, specimen C xv, scales, fin-bones and rays, described by Hills, loc. cit., p. 195, 1929.

Upper Devonian.

Blue Hills, near Taggerty, Victoria.

Coll. and pres. E. S. Hills, 20.2.29.

Labrodon depressus Chapman and Pritchard, 1907:—
Nummopalatus depressus (Chapman and Pritchard, 1907.)

Trygon ensifer J. W. Davis (*pars*), Trans. Roy. Dubl. Soc. [2] 4, p. 37, pl. 6, figs. 13, *13a*, *13b*, 1888.

Labrodon depressus F. Chapman and G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 20 (1), p. 66, pl. 5, figs. 8, 9, August, 1907. F. Chapman, N.Z. Geol. Surv. Pal. Bull. 7, p. 27, pl. 6, figs. 13, *13a*, *13b*, 1918.

Nummopalatus depressus Chapman and Pritchard sp.: F. Chapman and F. A. Cudmore, Proc. Roy. Soc. Vic., n.s., 36 (2), p. 143, pl. 11, fig. 43, 1924.

M.U.G.D. No. 1836. Holotype, pharyngeal, figured by Chapman and Pritchard, loc. cit., 1907.

Upper Miocene (Cheltenhamian).

Beaumaris, Port Phillip, Victoria. Though not so stated, it is almost certainly from the nodule bed at this locality.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Myliobatis moorabbinensis Chapman and Pritchard, 1907.

Myliobatis moorabbinensis F. Chapman and G. B. Pritchard, Proc. Roy. Soc. Vic., n.s., 20 (1), p. 60, pl. 5, figs. 1-3, August, 1907. F. Chapman and F. A. Cudmore, *ibid.*, 36 (2), p. 138, 1924. Not "*Myliobatis moorabbinensis* Chapman and Pritchard": F. Chapman and C. J. Gabriel, *ibid.*, 27 (1), p. 57, pl. 10, fig. 57, 1914. F. Chapman, Rec. Geol. Surv. Vic., 3 (4), pp. 339, 353, 355, pl. 76, fig. 57, 1916. F. Chapman, Proc. Roy. Soc. Vic., n.s., 29 (2), p. 139, pl. 9, fig. 8 (=*Myliobatis affinis* F. Chapman and F. A. Cudmore, loc. cit., p. 139, pl. 10, fig. 36, 1924).

M.U.G.D. No. 1833. Paratype, figured by Chapman and Pritchard, loc. cit., fig. 3, 1907.

Upper Miocene (Cheltenhamian).

Beaumaris, Port Phillip, Victoria. Though not so labelled, it is almost certainly from the nodule bed at the base of the cliffs.

Purchased from Dr. G. B. Pritchard, 11.10.39.

Nummopalatus depressus (Chapman and Pritchard, 1907).

See *Labrodon depressus*, Chapman and Pritchard, 1907.

Phyllolepis sp.

Holonema cf. *rugosum* Newberry, 1889 [recte (Claypole, 1886)]: E. S. Hills, Proc. Roy. Soc. Vic., n.s., 41 (2), p. 197, April, 1929. Not *Pterichthys* (?) *rugosus* E. W. Claypole, Proc. Amer. Phil. Soc., 20 p. 666, with fig. 1883 = *Holonema rugosum* J. S. Newberry, Palaeozoic Fishes N. America, p. 92, 1889.

Phyllolepid plates: E. S. Hills, Geol. Mag., 68 (5), p. 212, text figs. 2 (p. 212), 3 (p. 213), May, 1931.

Phyllolepis sp.: E. S. Hills, Proc. Roy. Soc. Vic., n.s., 48 (2), p. 164, text fig. 4, pl. 12 (p. 170), figs. 1, 2, June, 1936.

M.U.G.D. No. 790. Figured specimen C.H., lateral plate, described by Hills, loc. cit., 1929, and figured, pl. 12, fig. 2, 1936.

M.U.G.D. No. 791. Figured specimen, plate, Type 1, figured by Hills, loc. cit., text fig. 2, No. 1, 1931.

M.U.G.D. No. 1878. Figured specimen, T.3a P, plate, Type 1, figured by Hills, loc. cit., text fig. 2, No. 2, 1931.

M.U.G.D. No. 1879. Counterpart of figured specimen No. 1878.

M.U.G.D. No. 1880. FIGURED SPECIMEN, T.1*a* P, plate, Type 2, figured by Hills, loc. cit., text fig. 2, No. 3, 1931.

Upper Devonian.

Blue Hills, near Taggerty, Victoria.

Coll. and pres. E. S. Hills, 20.2.29.

M.U.G.D. No. 1587. FIGURED SPECIMEN, ventral plate, figured by Hills, loc. cit., text fig. 4, 1936.

Upper Devonian.

Allotment 75A, Parish of Loyola, South Blue Range, near Mansfield, Victoria.

Coll. H. B. Hauser, 1933.

Spaniodon elongatus Pictet, 1850.

Spaniodon elongatus F. J. Pictet, Poiss. Foss. Mt. Liban, p. 35, pl. 6, figs. 1, 2, 1850. F. J. Pictet et A. Humbert, Nouv. Rech. Poiss Foss. Mt. Liban, p. 85, pl. 12, figs. 1, 2, 1866. J. W. Davis, Sci. Trans. Roy. Dublin Soc., [2] 3, p. 588, April, 1887. A. S. Woodward, Cat. Foss. Fishes Brit. Mus., pt. 4, p. 51, pl. 7, fig. 3, 1901. E. S. Hills, Proc. Roy. Soc. Vic., n.s., 48 (1), p. 50, pl. 2, December, 1935.

M.U.G.D. No. 833. HYPOTYPE, figured by Hills, loc. cit., 1935.

Upper Cretaceous.

Mount Lebanon, Syria.

Purchased from T. Worcester.

CETACEA.

Mammalodon colliveri Pritchard, 1939.

Mammalodon colliveri G. B. Pritchard, Vic. Naturalist, 55 (9), p. 157, text figs. 1 (p. 152), 2 (p. 154), 3 (p. 156), 4, 5 (p. 157), 4th January, 1939.

M.U.G.D. No. 1874. HOLOTYPE, skull and lower jaw, figured by Pritchard, loc. cit., 1939.

Miocene (Janjukian).

Lower beds, Bird Rock cliffs, near Spring Creek, Torquay, Victoria. "About 12 ft. above the level of the beach . . . barely a hundred yards around [S.W. of] the Bird Rock corner . . . ." (Pritchard, loc. cit., p. 151, 1939). It is from about a foot above the Spring Creek ledge at its extreme S.W. margin (F. S. Colliver, personal communication, 23.10.44) and is thus from within the Glycymeris beds.

Pres. F. S. Colliver, 19.10.39.

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PART I.

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